Danilo Orlando
Curriculum Vitae

November 2021

Contents

1 Personal Information

Last Name and First Name	:	**Orlando Danilo**
Place and Date of Birth	:	Gagliano del Capo (Lecce), Italy, August 09, 1978
Office Address	:	Università degli Studi "Niccolò Cusano", Via Don Carlo Gnocchi, 3, 00166 Rome, Italy
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2 Qualifications and Training

2.1 Educational Qualifications

- **Ph.D. in Information Engineering** received from Università del Salento, Lecce, Italy, on February 15, 2008. Ph.D. dissertation original title: "Design and Analysis of Adaptive Radar Receivers in Presence of Mismatched Signals and/or with Enhanced Sidelobe Targets Rejection Capabilities". Supervisor: Prof. Giuseppe Ricci. Final grade: Ottimo. Course duration: 3 years.
- **Dr. Eng. (Laurea) Degree in Computer Engineering** received from Università degli Studi di Lecce, Lecce, Italy, on April 27, 2004. Thesis original title: "Analisi e Sintesi di Algoritmi per la Ricostruzione della Fase Assoluta di Interferogrammi SAR". Advisor: Ing. Manlio Tesauro. Final grade: 110/110 cum Laude. Course duration: 5 years.
- **Secondary School (Diploma) degree** received from Liceo Scientifico Statale "Giulio Cesare Vanini", Casarano (LE), Italy, 1996. Course duration: 5 years.
- **Diploma di Teoria e Solfeggio (third year degree)** received from Conservatory "Tito Schipa", Lecce, Italy, 1993

2.2 Professional Qualifications

Professional Qualification as Engineer through state exam in the I Session of 2004, Università degli Studi di Lecce (now Università del Salento), Lecce, Italy.

2.3 Additional Courses and Training

- March 8, 2011-May 24, 2011. English Course (B2-level) held by Dr. Thomas Christiansen at Dipartimento di Lingue e Letterature Straniere, Università del Salento, Italy.
- February 1, 2007-March 31, 2007. *Visiting Scholar* at the Department of Avionics and Systems, Ecole Nationale Supérieure d'Ingénieurs de Constructions Aéronautiques (ENSICA) (now Institut Supérieur de l'Aéronautique et de l'Espace, ISAE), Toulouse, France, working with Prof. Olivier Besson.
- October 2006. PhD course entitled "Calcolo Simbolico" held by Prof. Francesco Oliveri (Università degli Studi di Messina) at Dipartimento di Matematica, Università degli Studi di Lecce, Lecce, Italy.

- November 23 - November 25, 2005. PhD course entitled “Problemi e Metodi di Stima per Sistemi Stocastici” held by Prof. Sergio Bittanti at Dipartimento di Elettronica e Informazione, Politecnico di Milano, Milan, Italy. Final grade: **A**.

- September 12 - September 13, 2005. PhD course entitled “Robust Optimization” held by Prof. Mustafa C. Pinar (Bilkent University, Ankara, Turkey), at Dipartimento di Matematica, Università degli Studi di Lecce, Lecce, Italy.

- August 1 - September 4, 2004. Summer School in Mathematics, Perugia, Italy. Attended courses:

  1. *Probability Theory*, instructor: Prof. Alberto Gandolfi, Università degli Studi di Firenze, Firenze, Italy.
  2. *Mathematical Statistics*, instructor: Prof. Pietro Rigo, Università degli Studi di Pavia, Pavia, Italy.

- Attendance to conferences, seminars, and doctoral courses in the field of Information Technology.

3 Career Details and Positions

January 2005 - February 2008. *Ph.D. Student in Information Engineering* working on radar adaptive detection and tracking at Dipartimento di Ingegneria dell’ Innovazione, Università del Salento, Lecce, Italy. Supervisor: Prof. Giuseppe Ricci.

July 2007 - July 2010. *Contract Researcher* engaged in the research project FIRB 2006 entitled “Metodologie e Tecnologie Innovative per Radar Avionici con antenna a Scansione Elettronica (IMT-ARSEL)”. Coordinator: Prof. Marco Lops, Università degli Studi di Cassino, Cassino, Italy.

September 2009 - November 2009. *Visiting Scientist* at NATO Undersea Research Centre (NURC), La Spezia (Italy), working with Dr. Frank Ehlers on Track-Before-Detect Algorithms for Bistatic Sonars.

December 2010 - August 2011. *Research Associate* at Dipartimento di Ingegneria dell’Innovazione, Università del Salento, Lecce, Italy. Supervisor: Prof. Giuseppe Ricci.

NURC-VRP 2011. He has been invited to spend three months at NATO Undersea Research Centre (NURC), La Spezia (Italy), for the period from the 3rd of October 2011 to the 23rd of December 2011, as a Visiting Scientist, under the supervision of Dr. Kevin LePage on the “System concepts and performance estimation for autonomous ASW project”.

September 2011 - April 2015. System Analyst in the field of Electronic Warfare at Elettronica S.p.A., Via Tiburtina Valeria Km 13,700, 00131 Rome, Italy, responsible for design, analysis, and integration of direction finding, passive location, and ELINT algorithms.

May 2015 - now. Associate Professor for Signal Processing and Telecommunications at Università degli Studi “Niccolò Cusano”, via Don Carlo Gnocchi, 3, 00166 Rome, Italy.

4 Scientific Collaborations

- Prof. Antonio De Maio, Dipartimento di Ingegneria Elettronica e delle Telecomunicazioni, Università degli Studi di Napoli "Federico II", Napoli, Italy.
- Prof. Peter Stoica, Department of Information Technology, Uppsala University, P O Box 337, SE-751 05, Uppsala, Sweden.
- Prof. Jian Li, Department of Electrical & Computer Engineering, University of Florida, US.
- Prof. Giuseppe Bianchi, Department of Electronic Engineering, University of Rome Tor Vergata and CNIT, Via del Politecnico, 1 00133, Rome, Italy
- Prof. Nicola Blefari Melazzi, Department of Electronic Engineering, University of Rome Tor Vergata and CNIT, Via del Politecnico, 1 00133, Rome, Italy
- Prof. Alfonso Farina, SELEX-Sistemi Integrati (retired), Roma, Italy.
- Prof. Giuseppe Ricci, Dipartimento di Ingegneria dell'Innovazione, Università del Salento, Lecce, Italy.
- Prof. Olivier Besson, Department of Electronics, Optronics and Signal Processing, Institut Supérieur de l'Aéronautique et de l'Espace (ISAE), Toulouse, France.
- Prof. Louis L. Scharf, Department of Electrical and Computer Engineering, Colorado State University, Colorado, US.
- Prof. Yaakov Bar-Shalom, Department of Electrical and Computer Engineering, University of Connecticut, US.
- Prof. Marco Lops, DAEIMI, Università degli Studi di Cassino, Cassino, Italy.
- Dr. Frank Ehlers, Bundeswehr Technical Centre for Ships and Naval Weapons, Naval Technology and Research (WTD 71), Klausdorfer Weg 2, 24148 Kiel, Germany.
- Prof. Chengpeng Hao, State Key Laboratory of Information Technology for Autonomous Underwater vehicles, Chinese Academy of Sciences, 100190 Beijing, China.
- Prof. Jun Liu, Department of Electronic Engineering and Information Science, University of Science and Technology of China, Hefei 230027, China.
- Prof. Chaohuan Hou, State Key Laboratory of Information Technology for Autonomous Underwater vehicles, Chinese Academy of Sciences, 100190 Beijing, China.
- Prof. Shefeng Yan, State Key Laboratory of Information Technology for Autonomous Underwater vehicles, Chinese Academy of Sciences, 100190 Beijing, China.
- Prof. Saeed Gazor, Department of Electrical and Computer Engineering, Queen's University, Kingston, Ontario, Canada.
- Dr. Goffredo Foglia, Elettronica S.p.A., Via Tiburtina Valeria Km 13,700, 00131 Rome, Italy.

5 Memberships

He has been or is a member of the international research/professional groups

- 2022-2023. IEEE Sensor Array and Multichannel Technical Committee.
- NATO Working group SET-199 for the evaluation of the effectiveness of coordination methods for distributed mobile sensors;
- IEEE Signal Processing Society (**Senior Membership**);
- ISIF-MSTWG (*International Society of Information Fusion-Multistatic Tracking Working Group*);
- DMSIG (*Distributed Mobile Sensors Interest Group*);
- ICST (*Institute for Computer Sciences, Social Informatics and Telecommunications Engineering*).

6 Scientific Qualifications

- National Scientific Qualification (ASN) to Associate Professor of Telecommunications, Ministero dell'Istruzione, Università e Ricerca, Italy, December 2013.
- National Scientific Qualification (ASN) to Full Professor of Telecommunications, Ministero dell'Istruzione, Università e Ricerca, Italy, March 2018.

7 Awards

- **Top 2 % Researchers for 2020**, Stanford University.
- **Top 2 % Researchers for 2019**, Stanford University.
- **Best Paper Award** at *2020 IEEE 7th International Workshop on Metrology for AeroSpace (MetroAeroSpace)*, Pisa, Italy, 2020.
- **Second Alternate Top 5 Finalist** in the Student Paper Competition at *2019 IEEE Radar Conference*.
- **Outstanding Reviewer**. In recognition of the contributions made to the quality of Elsevier Signal Processing (October 2018).
- **IEEE Senior Membership**. In recognition of professional standing, he has been elected Senior Member by the Officers and Board of Directors of the IEEE (2013).
- **Appreciated Reviewer** for IEEE Transactions on Signal Processing (2008)

8 Invited Seminars and Courses

- September 2021. Talk entitled "Radar and Wireless Networks: A Signal Processing Perspective" at GTTI meeting, Università del Salento, Lecce, Italy.
- July 2021. Invited talk entitled "Innovative Two-Stage Radar Detection Architectures in Adverse Scenarios Using Two Training Data Sets" at SIILP2020, Xidian University, China.
- July 2021. Invited talk entitled "Multiple Hypothess in Radar: Classification and Detection Architectures" at 3rd International Symposium on Multi-modal Sensing and Information Processing (ISMSIP 2021), Xidian University, China.
- October 2020. Invited talk entitled "Signal-Processing-Related Electronic Counter-CounterMeasures against Interfering Signals" at *IEEE WiSEE 2020*, Vicenza, Italy.
- August 2020. Invited talk entitled "New Develepments in ECCM Techniques" at SIILP2020, Xidian University, China.
- November 2019. Lecture on "New ECCM Techniques Against Noise-like and/or Coherent Interferers" at Institute of Acoustics, Chinese Academy of Sciences, Beijing, China.
- November 2019. Lecture on "Adaptive Radar Detection of Dim Moving Targets in Presence of Range Migration" at Institute of Acoustics, Chinese Academy of Sciences, Beijing, China.
- November 2019. Lecture on "Track-before-detect Algorithms for Bistatic Sonar" at Institute of Acoustics, Chinese Academy of Sciences, Beijing, China.
- July 2018. Course for undergraduate students on "Radar Signal Processing" at the Chinese Academy of Sciences, Beijing, China.
- July 2018. Lecture on "Adaptive Detection Using Double Training Data Set", at Institute of Acoustics, Chinese Academy of Sciences, Beijing, China.
- July 2018. Lecture on "Detection of Multiple Noise-like Jammers for Radar Applications", at Institute of Acoustics, Chinese Academy of Sciences, Beijing, China.
- July 2018. Lecture on "Digital Beamforming" at the 2018 International Workshop on Signal and Information Intelligent Learning and Processing, Xidian University, Xidian, China.
- July 2017. Lecture on "Statistical Invariance in Radar" at Institute of Acoustics, Chinese Academy of Sciences, Beijing, China.
- July 2017. Course for undergraduate students on "Radar Signal Processing" at the Chinese Academy of Sciences, Beijing, China.
- July 2016. Series of Lecture on "CFAR techniques for Search Radars" at Rheinmetall Italia, Rome, Italy.

9 Research Activity

9.1 Main fields of interest

The research activity mainly concerns the area of statistical signal processing with emphasis on the following topics

- Adaptive Radar Detection of Extended Targets in Homogeneous Noise and Subspace Interference.
- Adaptive Radar Detection of Extended and Multiple Point-like Targets without Assignment of Secondary Data.
- Adaptive Radar Detection in the Presence of Mismatched Signals.
- Design and Analysis of Track-Before-Detect Algorithms for Multistatic Systems.
- Design and Analysis of Tracking Algorithms.
- Adaptive Detection and Classification of Radar Echoes.
- Adaptive Detection and Localization of Point-like Targets in Homogeneous and Partially-Homogeneous Environments.
- Design and Analysis of Algorithms for Passive Localization.
- Design and Analysis of Algorithms for Electronic (Signal) Intelligence (ELINT).
- Design and Analysis of Detection Algorithms Exploiting Structure Information on Interference Covariance Matrix.
- Design and Analysis of Invariant Adaptive Detectors.
- Classification and Estimation of the Interference Covariance Structure in Homogeneous and Heterogeneous Environments.
- Channel Estimation in the Presence of Shadowing.
- Classification and Estimation Algorithms for (possibly polarimetric) Synthetic Aperture Radar images.
- Jamming/spoofing detection algorithms for mobile communication networks.

9.2 Description and main results

9.2.1 Adaptive Radar Detection of Extended Targets in Noise and Interference

A class of adaptive detection algorithms is derived and assessed in [IJ-2][IC-2]. The aim of the proposed algorithms is to discriminate, resorting to an array of sensors, between the H_0 hypothesis that data under test contain disturbance only (i.e., noise plus interference) and the H_1 hypothesis that they also contain signal components along a direction which is a priori unknown, but constrained to belong to a given subspace of the observables. The disturbance is modeled in terms of complex normal random vectors plus deterministic interference assumed to belong to a known subspace. It is assumed that a set of noise only (secondary) data, sharing the same statistical characterization of noise in the cells under test, is available. At the design stage both the plain Generalized Likelihood Ratio Test (GLRT) and the two-step GLRT-based design procedure are used. The performance assessment, conducted resorting to simulated data, shows that the plain GLRT performs better than the ad hoc detector, although at the price of a certain increase of the computational complexity, when the number of secondary data is comparable to the number of sensors. However, simulation studies also indicate that the gains of the former with respect to the latter are in the order of 1 dB (or less) when the number of secondary data is twice greater than the number of sensors. The comparison with a subspace detector[1] shows that the GLRT direction detector can guarantee significant gains when the dimension of the signal subspace is sufficiently high. Finally, it is important to stress that proposed detectors guarantee Constant False Alarm Rate (CFAR) property with respect to the covariance matrix of the disturbance [IJ-3].

9.2.2 Adaptive Radar Detection without Assignment of Secondary Data

The adaptive radar detection of extended and multiple point-like targets is addressed [IJ-1][IC-1] and new detection structures are proposed. The aim of such structures is to detect extended and multiple point-like targets within K range cells in presence of correlated disturbance and without assignment of a distinct set of secondary data. To this end, an extended target is modeled as a set of scatterers constrained to belong to H "consecutive" range cells, with H denoting, in turn, the ratio between the maximum target (range) extension and the radar range resolution; multiple point-like targets are modeled, instead, in terms of H scatterers (at most) without any constraint on the relative distances (i.e., not constrained to belong to H consecutive cells). Obviously, the latter model generalizes the former in the sense that it relaxes the a priori knowledge on the location of the possible useful signals within the range cells under test. In both cases it is investigated to what extent it is possible to get rid of secondary data; more precisely, the plain GLRT, with respect to the unknown statistics of the disturbance and the unknown parameters of the target (including its "position"), and ad hoc design procedures are adopted. Performance analysis shows that proposed detectors guarantee satisfactory performance for the considered simulation parameters, i.e., K sufficiently greater than the number of range cells contaminated by useful signals and H close (from above) to such number in order to limit possible collapsing loss.

9.2.3 Adaptive Radar Detection in the Presence of Mismatched Signals

The adaptive radar detection of point-like targets in the presence of mismatched signals is addressed. In realistic scenario mismatches are likely to occur, due to both environmental and instrumental factors. When a mismatched signal is present in the data under test, conventional algorithms, designed under the assumption of a perfect knowledge of the target steering vector, may suffer severe performance degradation and, more important, they

[1] Proposed in F. Bandiera, A. De Maio, A.S. Greco, and G. Ricci, "Adaptive Radar Detection of Distributed Targets in Homogeneous and Partially Homogeneous Noise Plus Subspace Interference," *IEEE Transactions on Signal Processing*, Vol. 55, No 4, pp. 1223-1237, April 2007.

cannot "adjust" their behavior to face with different operating scenarios. An ideal detector should exhibit a response which falls off rapidly as the degree of mismatch between the received signal and the postulated one increases, in order to lower the probability of detection of sidelobe signals. However, it is also necessary to maintain an acceptable detection loss for slightly mismatched signals. Unfortunately such requirements cannot be met at the same time and a viable approach is to design detectors capable of trading detection performance of mainlobe targets for rejection capabilities of sidelobe interferers. To this end, the class of the so-called *tunable* receivers is investigated. The term tunable concerns the fact that such detectors require to set some design parameter in order to obtain the desired behavior in terms of directivity. More precisely, the directivity of existing tunable receivers can be adjusted by setting either a parameter which appears in the decision statistic (the so-called *parametric* receivers) or a proper threshold (the so-called *two-stage* detectors).

A family of parametric detectors for extended targets is proposed in [IJ-9][IC-5], where the actual useful signal is modeled as a vector belonging to a proper cone with axis the nominal steering vector (*conic acceptance idea*). This model allows to come up with robust decision rules. On the other hand, enhanced rejection capabilities of sidelobe signals are obtained by replacing the usual noise only hypothesis with a noise plus interferers hypothesis where interferers belong to the complement of a cone with axis the nominal steering vector (*conic acceptance/rejection idea*). The directivity of the resulting detectors can be tuned by means of a real parameter which governs the "aperture" of the cone.

Parametric receivers are also obtained by exploiting the similarities existing between the decision statistics of detectors with different behaviors. In particular, it is possible to manipulate those factors which make different the corresponding statistics by introducing a proper parameter in order to generate receiver operating characteristics in between those of the considered detectors. In [IJ-8][IC-6] a parametric detector, aimed at increasing the selectivity of Kelly's detector[2], is obtained by combining it with the W-ABORT detector[3] (see also [IJ-5][IC-3]). The performance assessment, conducted in closed form for both matched and mismatched signals, highlights that the proposed detector, referred to in the following as KWA, can ensure better rejection capabilities than its natural competitors at the price of a certain detection loss for matched signals.

The class of two-stage receivers is obtained by cascading two detectors, usually with opposite behaviors in terms of directivity. The receiver declares the presence of a target in the data under test only when the decision statistics of both stages are above the corresponding thresholds. It can be seen as a logical AND between the two receivers. The tuning capability is provided by the infinite number of threshold pairs that ensure the same value of probability of false alarms; more precisely, a proper selection of the two thresholds allows to adjust directivity. In contrast to parametric receivers, two-stage detection schemes, due to their modular structure, typically guarantee a wider range of directivity. A rather famous two-stage detector is the adaptive sidelobe blanker (ASB), which consists of the cascade of the AMF and the ACE. Such detector has been proposed as an effective means for mitigating the high number of false alarms of the AMF due to

[2]Proposed in E. J. Kelly, "An adaptive detection algorithm," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 22, No. 2, pp. 115-127, March 1986.

[3]Proposed in F. Bandiera, O. Besson, and G. Ricci, "An ABORT-like Detector with Improved Mismatched Signals Rejection Capabilities," *IEEE Transactions on Signal Processing*, Vol. 56, No. 1, pp. 14-25, January 2008.

the presence of clutter inhomogeneities[4]. In order to increase the operational range of the ASB in robustness, in [IJ-6] a modification of it (referred to as S-ASB) is proposed. To this end, the AMF is replaced by a subspace GLRT-based detector[5], which is capable of coping with highly mismatched signals and, more important, it does not suffer high floors, which are typical of the AMF. In [IJ-7][IC-4][IJ-8] new solutions aimed at improving the selectivity of the S-ASB are investigated. More specifically, in [IJ-7][IC-4] the S-ASB is modified by substituting the ACE with the W-ABORT detector, while in [IJ-8] the ACE is replaced by the KWA. The performance assessment, carried out in closed form, confirms that such innovative solutions allow to increase the operational range in terms of tunability in comparison to existing ones, while retaining, at the same time, an overall performance for matched signals commensurate with Kelly's detector (usually regarded as a benchmark for performance comparison). In [IJ-36], a definite study on two-stage detection idea is provided along with additional schemes.

9.2.4 Track-Before-Detect Strategies for Multistatic Systems

Track-before-detect (TBD) algorithms are derived and assessed in the context of space-time adaptive processing (STAP) [IJ-10][IC-7]. More precisely, it is assumed that the system under consideration is equipped with a linear array that illuminates the surveillance area by transmitting M coherent pulse trains before deciding whether or not a target is present over L adjacent range cells. At the design stage, GLRT-based and ad hoc procedures are used to derive constant false track acceptance rate (CFTAR) detectors assuming either an *heterogeneous* scenario (where the unknown clutter covariance matrix can possibly change from scan to scan) or an *homogeneous* scenario (where the unknown clutter covariance matrix remains constant from scan to scan). The preliminary performance assessment shows that knowledge of the operating environment (whether homogeneous or heterogeneous) is of fundamental importance. In fact, detectors derived under the homogeneous assumption outperform those derived under the heterogeneous one when both are fed by homogeneous data; in addition, the former are less demanding than the latter from the computational point of view. However, if the homogeneous assumption is not met, the former are no longer CFAR processors.

In [IJ-11] derivations of [IJ-10] are extended in order to take into account possible spillover of target energy to adjacent range cells and a target kinematic model is assumed. A modification of the maximum likelihood-probabilistic data association (ML-PDA) algorithm capable of working with data from an array of sensors is also proposed. The performance assessment shows that TBD algorithms can outperform modified ML-PDA especially in terms of probability of track detection.

In [IC-10] previous algorithms are modified in order to handle raw hydrophone data assuming a bistatic architecture. As a preliminary step, the mathematical model for the received signal is introduced. Then, resorting to design criteria based upon the GLRT, a class of adaptive CFTAR detectors is derived. A preliminary performance assessment, conducted using raw data collected in the course of PreDEMUS'06 sea trial, highlights

[4]See C. D. Richmond, "Statistical Performance Analysis of the Adaptive Sidelobe Blanker Detection Algorithm," *In Proc. of 31st Annual Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, USA, November 1997.

[5]Proposed in E. J. Kelly and K. Forsythe, "Adaptive Detection and Parameter Estimation for Multidimensional Signal Models," Lincoln Lab, MIT, Lexington, MA, Tech. Rep. No. 848, April 19, 1989.

that such a class of processors guarantees good detection performance of weak moving targets and provides, as a byproduct, a rough estimate of the corresponding locations.

Finally, in [IC-13] it is proposed a TBD-like tracker designed to work in a multistatic sonar environment where measurements collected by different sensors are sent to a fusion center. The performance assessment, carried out on simulated scenarios, shows that the proposed algorithm has acceptable performance also when the probability of detection per sensor is low (in the order of 0.3) and measurement errors are significant.

9.2.5 Adaptive Detection and Classification of Radar Echoes

The activity focuses on adaptive detection and classification of coherent signals in order to discriminate between signals backscattered from point-like targets and those generated by a digital radio frequency memory (DRFM) system in presence of thermal noise, clutter, and possible noise-like interferers [IJ-13]. To this end, a generalized Neyman-Pearson rule (i.e., for multiple hypotheses) is used assuming that the received signal may contain:

1. thermal noise plus clutter (including noise-like interferers);
2. a noisy version of the signal backscattered by the target;
3. coherent interferers.

The proposed detector relies on secondary data, free of signal components but sharing the statistical characterization of the noise in the cell under test, and guarantees the CFAR property. The performance assessment shows that it can outperform the modified ASB in presence of electronic countermeasure systems. It is important to stress that all of the considered detection schemes cannot correctly classify the presence of both a target and a DRFM signal. Such an open problem deserves further attention.

9.2.6 Adaptive Detection and Localization of Point-like Targets

A class of adaptive decision schemes for point-like targets is derived [IJ-14,IJ-23,IJ-25,IJ-26,IJ-27,IJ-30,IJ-32]; the proposed algorithms can take advantage of the possible spillover of target energy between consecutive matched filter samples. The radar cross-section of the target is modeled in terms of an unknown complex factor while Doppler frequency shift and direction of arrival of the signal impinging on the radar antenna are assumed known. A set of secondary data is assumed available at the receiver. Two different operating scenarios are considered:

- homogeneous scenario, where secondary data and the cell under test share the same spectral properties of the noise;
- partially-homogeneous scenario, where noise covariance matrix of the cell under test (CUT) and that of secondary data coincide only up to a scaling factor.

Remarkably, proposed decision schemes can provide accurate estimates of the target position within the CUT and ensure the desirable CFAR property with respect to the unknown noise parameters. Even more important, not only the estimates can be fed to the tracking stage (assuming the usual distinction between detection and tracking stages), but the obtained results can also be used in the context of track-before-detect, as shown in part in [IJ-11], in order to guarantee a sub-bin accuracy.

9.2.7 Design and Analysis of Algorithms for Passive Localization

The activity is classified and focuses on the derivation of real-time solutions capable of measuring the position of electromagnetic sources by means of passive sensing systems. Specifically, such algorithms exploit bearing-only measurements or additional information as the time variation of the line-of-sight.

9.2.8 Design and Analysis of ELINT Algorithms

The activity is classified and concerns signal processing techniques aimed at estimating the parameters of possibly modulated waveforms. In particular, such algorithms are capable of returning the parameters of interest (chip time, number of phase and/or frequency jumps, bandwidth, etc.) for the most common phase and frequency modulations of pulse.

9.2.9 Design and Analysis of Knowledge-based Detection Algorithms

Most adaptive detectors for point-like or extended targets in homogeneous or partially-homogeneous environments are devised assuming that a set of the training samples, which are free of signal components (secondary data) but sharing the same covariance matrix of the noise in the samples under test (primary data), is available. Unfortunately, the secondary data are often contaminated by power variations over range, clutter discretes, and other outliers. In these situations, the secondary data may not be representative of the primary data. As a consequence, the sample covariance matrix of the secondary data yields significant performance degradations and the constant false alarm rate property is no longer ensured.

A possible means to circumvent the lack of a sufficient number of homogeneous secondary data is to exploit the structural information of the noise spectral properties. Many applications can result in a disturbance covariance matrix that has some sort of special structure. For instance, a detection system utilizing a symmetrically spaced linear array or symmetrically spaced pulse trains could collect data statistically symmetric in forward and reverse directions. It has been shown that the resulting disturbance covariance matrix has a so-called “doubly” symmetric form, i.e., Hermitian about its principal diagonal and persymmetric about its cross diagonal.

In [IJ-19] two new detectors are devised by means of the Rao test and the Wald test design criteria assuming partially-homogeneous scenarios and persymmetric structured covariance matrix of the disturbance. The performance assessment shows that the proposed detectors exhibit the same performance of the (existing) plain generalized likelihood ratio test for perfectly matching conditions. On the other hand, in the case of mismatched signals, the Wald test provides an enhanced robustness whereas the Rao test is the most selective. In [IJ-21] the GLRT and the two-step GLRT-based design procedure are employed to come up with decision architectures for distributed targets assuming the same scenario as in [IJ-19]. In [IJ-22] the persymmetric structure of the interference covariance matrix is used in conjunction with the orthogonal rejection idea, which assumes under the H_0 hypothesis the presence of a fictitious signal orthogonal to the nominal one. Under the above framework and assuming the homogeneous environment, the GLRT is designed; the Rao test for the conventional detection problem is also derived. The performance analysis, conducted resorting to Monte Carlo simulation, highlights an increased selectivity of the proposed detectors while retaining a limited matched detection loss with respect to the plain GLRT for the conventional problem. Further examples of a priori knowledge exploitation at the design stage can be found in [IJ-31,IJ-32,IJ-37,IJ-45,IJ-46].

9.2.10 Invariance in Adaptive Detection

In [IJ-34, IJ-35], the I-GMANOVA model is adopted in the context of adaptive radar detection. The considered model allows for the presence of a structured (partially known) non-zero mean under both hypotheses. Such disturbance is collectively represented as an unknown deterministic matrix, which determines an additional set of nuisance parameters for the considered hypothesis testing (i.e., other than the covariance matrix). The aforementioned model easily accounts for the presence of structured subspace interference affecting the target detection task. Thus it is clear that taking such interference into consideration enables the application of this model to adaptive radar detection; for instance it may accomodate the presence of multiple pulsed coherent jammers impinging on the radar antenna from some directions.

Although several different decision criteria can be considered to attack composite hypothesis testing problems, an elegant and systematic way consists in resorting to the so-called *Principle of Invariance*. Indeed, the aforementioned principle, when exploited at the design stage, allows to focus on decision rules enjoying some desirable practical features. The preliminary step consists in individuating a suitable group of trasformations which leaves the formal structure of the hypothesis testing problem unaltered. With reference to radar adaptive detection, the mentioned principle represents an effective tool for obtaining a statistic which is invariant with respect to the set of nuisance parameters, therefore constituting the basis for Constant-False Alarm Rate (CFAR) rules. Indeed, every invariant decision rule can be written in terms of the maximal invariant statistic. Therefore, with reference to I-GMANOVA model, the principle of invariance allows for imposing CFARness property with respect to the clutter plus noise (disturbance) covariance matrix and the jammer location parameters.

9.3 Work in Progress

The current research activity is focused on

- design and analysis of computational efficient tracking algorithms for multiple maneuvering targets;
- design and analysis of localization and detection algorithms based upon machine learning;
- design and analysis of jammer detection algorithm based upon compressed sensing;
- design and analysis of classification algorithm for polarimetric SAR images.

10 Research and Industry Projects

- **2018 - now**. Member of the Scientific Team engaged in the research project "111 Base for Radar Cognitive, Detection, Imaging, and Target Recognition" at Xidian University, China.

- **2019**. Responsible for the supply of an e-learning course at Elettronica SpA.
- **2018 - 2020**. Scientific Coordinator of a partnership agreement between Università degli Studi "Niccolò Cusano" and Elettronica SpA focused on industry research, education projects, and talent promoting.
- **2007 - 2010**. Engaged in the Research Project FIRB 2006 entitled: "Metodologie e Tecnologie Innovative per Radar Avionici con antenna a Scansione Elettronica (IMT-ARSEL)". Coordinator: Prof. Marco Lops, Università degli Studi di Cassino, Cassino, Italy.
- **2005 - 2006**. Engaged in the Research Project of Relevant National Importance (PRIN) 2004 entitled "Innovative Signal Processing Algorithms for Radar Target Detection and Tracking". Coordinator: Prof. Giuseppe Ricci, Università del Salento, Lecce, Italy.

11 Administrative Activity and Committees

A.Y. 2020/2021: *Member of Academic Board of the PhD in Industrial Engineering* at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy.

A.Y. 2020/2021: *Member of "Commissione Paritetica"* for the Engineering Area at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy.

2020: *Member of the Committee* for the selection of an associate professor at University "La Sapienza", Rome.

2019: *Member of the Committee* for the selection of an assistant professor at University "Roma TRE", Rome.

A.Y. 2019/2020: *Member of Academic Board of the PhD in Industrial Engineering* at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy.

A.Y. 2019/2020: *Member of "Commissione Paritetica"* for the Engineering Area at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy.

A.Y. 2018/2019: *Member of "Commissione Paritetica"* for the Engineering Area at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy.

A.Y. 2017/2018: *Member of "Commissione Paritetica"* for the Engineering Area at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy.

A.Y. 2016/2017: *Member of "Commissione Paritetica"* for the Engineering Area at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy.

A.Y. 2018/2019: *Member of Academic Board of the PhD in Industrial Engineering* at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy.

A.Y. 2017/2018: *Member of Academic Board of the PhD in Industrial Engineering* at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy.

A.Y. 2016/2017: *Member of Academic Board of the PhD in Industrial Engineering* at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy.

2016: *Member of the Committee* for the final PhD examination at the PhD School "Leonardo da Vinci" of University of Pisa.

12 Teaching

A.Y. 2020/2021: *Professor* for the PhD course "Statistical Signal Processing in Radar" (36 hours in the classroom) at the Institute of Acoustics, Chinese Academy of Sciences, Beijing, China. Language: English.

A.Y. 2020/2021: *Professor* for the graduate course "Electrical Communications" (9 CFU, about 60 hours in the classroom) at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy. Language: Italian.

A.Y. 2020/2021: *Professor* for the undergraduate course "Signals and Systems" (9 CFU, about 60 hours in the classroom) at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy. Language: Italian.

A.Y. 2019/2020: *Professor* for the PhD course "Statistical Signal Processing" (20 hours in the classroom) at the Institute of Acoustics, Chinese Academy of Sciences, Beijing, China. Language: English.

A.Y. 2018/2019: *Lectures* for graduate students entitled "Radar Systems: An Overview" (4 hours in the classroom) within the course XXX at Università degli Studi "Roma TRE", Roma, Italy.

A.Y. 2018/2019: *Professor* for the undergraduate course "Radar Signal Processing" (20 hours in the classroom) at the Chinese Academy of Sciences, Beijing, China. Language: English.

A.Y. 2018/2019: *Professor* for the PhD course "Fundamentals of Statistical Signal Processing" (24 hours in the classroom) at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy. Language: English.

A.Y. 2019/2020: *Professor* for the graduate course "Electrical Communications" (9 CFU, about 60 hours in the classroom) at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy. Language: Italian.

A.Y. 2019/2020: *Professor* for the undergraduate course "Signals and Systems" (9 CFU, about 30 hours in the classroom) at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy. Language: Italian.

A.Y. 2018/2019: *Professor* for the graduate course "Electrical Communications" (9 CFU, about 60 hours in the classroom) at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy. Language: Italian.

A.Y. 2018/2019: *Professor* for the undergraduate course "Signals and Systems" (9 CFU, about 30 hours in the classroom) at the Engineering Faculty of Università degli Studi "Niccolò Cusano", Rome, Italy. Language: Italian.

A.Y. 2018/2019: *Professor* for the undergraduate blended course “Signals and Systems” (9 CFU, about 60 hours in the classroom) at the Engineering Faculty of Università degli Studi “Niccolò Cusano”, Rome, Italy. Language: Italian.

A.Y. 2017/2018: *Lectures* for graduate students entitled “Radar Systems: An Overview” (4 hours in the classroom) within the course XXX at Università degli Studi “Roma TRE”, Roma, Italy.

A.Y. 2017/2018: *Professor* for the undergraduate course “Radar Signal Processing” (20 hours in the classroom) at the Chinese Academy of Sciences, Beijing, China. Language: English.

A.Y. 2017/2018: *Professor* for the graduate course “Electrical Communications” (9 CFU, about 60 hours in the classroom) at the Engineering Faculty of Università degli Studi “Niccolò Cusano”, Rome, Italy. Language: Italian.

A.Y. 2017/2018: *Professor* for the undergraduate course “Signals and Systems” (9 CFU, about 30 hours in the classroom) at the Engineering Faculty of Università degli Studi “Niccolò Cusano”, Rome, Italy. Language: Italian.

A.Y. 2017/2018: *Professor* for the undergraduate blended course “Signals and Systems” (9 CFU, about 60 hours in the classroom) at the Engineering Faculty of Università degli Studi “Niccolò Cusano”, Rome, Italy. Language: Italian.

A.Y. 2016/2017: *Professor* for the graduate course “Electrical Communications” (9 CFU, about 60 hours in the classroom) at the Engineering Faculty of Università degli Studi “Niccolò Cusano”, Rome, Italy. Language: Italian.

A.Y. 2016/2017: *Professor* for the undergraduate course “Signals and Systems” (9 CFU, about 60 hours in the classroom) at the Engineering Faculty of Università degli Studi “Niccolò Cusano”, Rome, Italy. Language: Italian.

A.Y. 2015/2016: *Professor* for the graduate course “Electrical Communications” (9 CFU, about 60 hours in the classroom) at the Engineering Faculty of Università degli Studi “Niccolò Cusano”, Rome, Italy. Language: Italian.

A.Y. 2015/2016: *Professor* for the undergraduate course “Signals and Systems” (9 CFU, about 60 hours in the classroom) at the Engineering Faculty of Università degli Studi “Niccolò Cusano”, Rome, Italy. Language: Italian.

A.Y. 2010/2011: *Aggregate Professor* for the graduate course “Digital Signal Processing and Laboratory” (9 CFU, about 78 hours in the classroom) at the Engineering Faculty of Università del Salento, Lecce, Italy. Language: Italian.

A.Y. 2010/2011: *Aggregate Professor* for the undergraduate course “Digital Signal Processing and Laboratory” at the Engineering Faculty of Università del Salento, Lecce, Italy. Language: Italian.

A.Y. 2009/2010: *Teaching Assistant* for the undergraduate course “Digital Signal Processing” at the Engineering Faculty of Università del Salento, Lecce, Italy. Language: Italian.

A.Y. 2009/2010: series of lectures on *Digital Terrestrial Television* for the graduate course “Telecommunication Systems” at the Engineering Faculty of Università del Salento, Lecce, Italy. Language: Italian.

A.Y. 2008/2009: *Teaching Assistant* for the undergraduate course “Digital Signal Processing” at the Engineering Faculty of Università del Salento, Lecce, Italy. Language: Italian.

A.Y. 2005/2006: series of lectures on *Digital Terrestrial Television* for the undergraduate course “Telecommunication Systems II” at the Engineering Faculty of Università del Salento, Lecce, Italy. Language: Italian.

A.Y. 2004/2005 - now: advisor and/or co-advisor for several undergraduate and graduate students in Computer Engineering and Electrical Engineering at Università del Salento, Lecce, and Università degli Studi “Niccolò Cusano”, Rome, Italy.

13 Editorial Activities

- (2016-2019) Senior Area Editor for *IEEE Transactions on Signal Processing.*
- Associate Editor for *IEEE Open Journal on Signal Processing.*
- Associate Editor for *MDPI Remote Sensing.*
- Associate Editor for *EURASIP Journal on Advances in Signal Processing.*
- Associate Editor for *AIMS Electronics and Electrical Engineering.*
- Lead Guest Editor of the Special Issue entitled “Advanced Techniques for Radar Signal Processing” published in *EURASIP Journal on Advances in Signal Processing.*
- TPC track chair EUSIPCO 2017.
- Reviewer for the following international Journals
  - IEEE Transactions on Signal Processing;
  - IEEE Signal Processing Letters;
  - IEEE Transactions on Aerospace and Electronic Systems;
  - IEEE Transactions on Information Theory;
  - IEEE Transactions on Geoscience and Remote Sensing;
  - Elsevier Signal Processing;
  - IET Radar, Sonar & Navigation;
  - EURASIP Journal on Advances in Signal Processing;
  - Chinese Journal of Aeronautics;
  - Journal of The Franklin Institute;
  - MDPI Algorithms.

- He has been member of the Editorial Board of the journal *Scientific World Journal*, Hindawi Publishing Corporation.
- He was nominated an *Appreciated Reviewer* for IEEE Transactions on Signal Processing in 2008.
- Reviewer for the following international Conferences
  - 14th European Signal Processing Conference 2006 (EUSIPCO 2006), Firenze (Italy), September 2006.
  - 20th European Signal Processing Conference 2012 (EUSIPCO 2012), Bucharest (Romania), August 2012.
  - 2012 IEEE Symposium on Industrial Electronics & Applications (ISIEA 2012), Bandung, Indonesia.
  - 7th International Conference on Communications and Networking in China (ChinaCom 2012), Kunming (People's Republic of China), August 2012.
  - 2014 IEEE Radar Conference, Cincinnati, OH, US, May 2014.
  - The 42nd IEEE International Conference on Acoustics, Speech and Signal Processing, ICASSP 2017, New Orleans, USA, 2017.
  - Radar 2017, International Conference on Radar Systems, 23-26 October 2017, Belfast Waterfront Conference Centre, UK.
  - 2017 IEEE Radar Conference, RadarConf'17, May 8-12, 2017, Seattle, US.
  - The 43nd IEEE International Conference on Acoustics, Speech and Signal Processing, ICASSP 2018, Alberta, Canada, 2018.
  - 26th European Signal Processing Conference 2018 (EUSIPCO 2018), Rome (Italy), September 2018.
- Technical Program Committee Member for
  - 7th International Conference on Communications and Networking in China (ChinaCom 2012), Kunming (People's Republic of China), August 2012.
  - WISEE 2021
- Technical Review Committee Member for
  - 2014 IEEE Radar Conference, Cincinnati, OH (US), May 2014.
  - 2015 IEEE Radar Conference, Arlington, Virgina (US), May 2015.
- Track Chair for
  - 2022 IEEE Radar Conference.
  - 2021 IEEE International Geoscience and Remote Sensing Symposium (IGARSS).
  - 2021 IEEE Radar Conference.
  - The Eleventh IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM 2020).
  - 2020 IEEE Radar Conference.
  - 2020 WISEE (Workshop on Sensors In Target Detection S1 and S2).

14 Personal Skills and Competences

14.1 Languages

Mother Tongue	**Comprehension**	**Speaking ability**	**Writing ability**	**Reading ability**
Italian	Fluent	Fluent	Fluent	Fluent
Other Languages	**Comprehension**	**Speaking ability**	**Writing ability**	**Reading ability**
English	Good	Fair	Good	Good

14.2 Computer Skills and Competences

- Good knowledge of the following Operating Systems: Microsoft Windows Xp/Vista /7, Ubuntu 8.10/9.10/10.04.
- Good knowledge of the following Word Processors: Microsoft Word, OpenOffice Writer.
- Good knowledge of the following Text Editors: WinEdt, Kile, Texmaker, Gedit, Kedit.
- Good knowledge of general purpose personal computers (notebooks, desktops, and netbooks) and workstations.
- Good knowledge of the following computer languages: C/C++, Visual Basic, ASP, XML, Java/JavaScript, SQL, VHDL, HTML/DHTML.
- Good knowledge of the following suites: Adobe Photoshop, Microsoft Office, Open Office, Mathematica, Matlab, Simulink, Derive.

14.3 Other Skills and Competences

- Running, Cycling, Soccer, and ping-pong.
- Playing piano (classical music, jazz, and blues).
- Photography (http://www.panoramio.com/user/1879382).

14.4 Driving License

Italian driving license of type B.

15 Publications

15.1 International Journals

IJ-1 F. Bandiera, D. Orlando, and G. Ricci, "CFAR Detection of Extended and Multiple Point-like Targets without Assignment of Secondary Data," *IEEE Signal Processing Letters*, Vol. 13, No. 4, pp. 240-243, April 2006.

IJ-2 F. Bandiera, O. Besson, D. Orlando, G. Ricci, and L.L. Scharf, "GLRT-Based Direction Detectors in Homogeneous Noise and Subspace Interference," *IEEE Transactions on Signal Processing*, Vol. 55, No. 6, pp. 2386-2394, June 2007.

IJ-3 F. Bandiera, D. Orlando, and G. Ricci, "On the CFAR property of GLRT-based Direction Detectors," *IEEE Transactions on Signal Processing*, Vol. 55, No. 8, pp. 4312-4315, August 2007.

IJ-4 O. Besson and D. Orlando, "Adaptive Detection in Nonhomogeneous Environments Using the Generalized Eigenrelation," *IEEE Signal Processing Letters*, Vol. 14, No. 10, pp. 731-734, October 2007.

IJ-5 F. Bandiera, O. Besson, D. Orlando, and G. Ricci, "Theoretical performance analysis of the W-ABORT detector," *IEEE Transactions on Signal Processing*, Vol. 56, No. 5, pp. 2117-2121, May 2008.

IJ-6 F. Bandiera, D. Orlando, and G. Ricci, "A Subspace-based Adaptive Sidelobe Blanker," *IEEE Transactions on Signal Processing*, Vol. 56, No. 9, pp. 4141-4151, September 2008.

IJ-7 F. Bandiera, O. Besson, D. Orlando, and G. Ricci, "An Improved Adaptive Sidelobe Blanker," *IEEE Transactions on Signal Processing*, Vol. 56, No. 9, pp. 4152-4161, September 2008.

IJ-8 F. Bandiera, D. Orlando, and G. Ricci, "One-stage and Two-stage Tunable Receivers," *IEEE Transactions on Signal Processing*, Vol. 57, No. 6, pp. 2064-2073, June 2009 and republished (due to an error of the publisher) Vol. 57, No. 8, pp. 3264-3273, August 2009.

IJ-9 F. Bandiera, D. Orlando, and G. Ricci, "CFAR Detection strategies for Distributed Targets under Conic Constraints," *IEEE Transactions on Signal Processing*, Vol. 57, No. 9, pp. 3305-3316, September 2009.

IJ-10 D. Orlando, L. Venturino, M. Lops, and G. Ricci, "Track-Before-Detect Strategies for STAP Radars," *IEEE Transactions on Signal Processing*, Vol. 58, No. 2, pp. 933-938, February 2010.

IJ-11 D. Orlando, G. Ricci, and Y. Bar-Shalom, "Track-before-detect Algorithms for Targets with Kinematic Constraints," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 47, No. 3, pp. 1837-1849, July 2011.

IJ-12 D. Orlando and G. Ricci, "A Rao Test with enhanced selectivity properties in homogeneous scenarios," *IEEE Transactions on Signal Processing*, Vol. 58, No. 10, pp. 5385-5390, October 2010.

IJ-13 F. Bandiera, A. Farina, D. Orlando, and G. Ricci, "Detection algorithms to discriminate between radar targets and ECM signals," *IEEE Transactions on Signal Processing*, Vol. 58, No. 12, pp. 5984-5993, December 2010.

IJ-14 D. Orlando and G. Ricci, "Adaptive radar detection and localization of a point-like target," *IEEE Transactions on Signal Processing*, Vol. 59, No. 9, pp. 4086-4096, September 2011.

IJ-15 C. Hao, D. Orlando, and C. Hou, "Rao and Wald Tests for Nonhomogeneous Scenarios," *MDPI Sensors*, Vol. 12, pp. 4730-4736, April 2012.

IJ-16 C. Hao, J. Yang, X. Ma, C. Hou, and D. Orlando, "Adaptive detection of distributed targets with orthogonal rejection," *IET Radar, Sonar and Navigation*, Vol. 6, No. 6, pp. 483-493, July 2012.

IJ-17 F. Ehlers, D. Orlando, and G. Ricci, "A Batch Tracking Algorithm for Multistatic Sonars," *IET Radar, Sonar and Navigation*, Vol. 6, No. 8, pp. 746-752, October 2012.

IJ-18 C. Hao, F. Bandiera, J. Yang, and D. Orlando, "Adaptive Detection of Multiple Point-Like Targets Under Conic Constraints," *Progress in Electromagnetic Research*, Vol. 129, pp. 231-250, 2012.

IJ-19 C. Hao, D. Orlando, X. Ma, and C. Hou, "Persymmetric Rao and Wald tests for Partially Homogeneous Environment," *IEEE Signal Processing Letters*, Vol. 19, No. 9, pp. 587-590, September 2012.

IJ-20 M. Del Coco, D. Orlando, and G. Ricci, "A Tracking System Exploiting Interaction Between a Detector with Localization Capabilities and the KF," *IEEE Transactions on Signal Processing*, Vol. 60, No. 11, pp. 6031-6036, July 2012.

IJ-21 C. Hao, D. Orlando, G. Foglia, X. Ma, S. Yan, and C. Hou, "Persymmetric Adaptive Detection of Distributed Targets in Partially-Homogeneous Environment," *Elsevier Digital Signal Processing*, Vol. 24, pp. 42-51, January 2014.

IJ-22 C. Hao, D. Orlando, X. Ma, S. Yan, and C. Hou, "Persymmetric Detectors with Enhanced Rejection Capabilities," *IET Radar, Sonar and Navigation*, Vol. 8, No. 5, pp. 557-563, June 2014.

IJ-23 A. De Maio, C. Hao, and D. Orlando, "An Adaptive Detector with Range Estimation Capabilities for Partially Homogeneous Environment," *IEEE Signal Processing Letters*, Vol. 21, No. 3, pp. 325-329, March 2014.

IJ-24 A. Aubry, A. De Maio, D. Orlando, and M. Piezzo, "Adaptive Detection of Point-Like Targets in the Presence of Homogeneous Clutter and Subspace Interference," *IEEE Signal Processing Letters*, Vol. 21, No. 7, pp. 848-852, July 2014.

IJ-25 A. Aubry, A. De Maio, G. Foglia, C. Hao, and D. Orlando, "A Radar Detector with Enhanced Range Estimation Capabilities for Partially Homogeneous Environment," *IET Radar, Sonar and Navigation*, Vol. 8, No. 9, pp. 1018-1025, September 2014.

IJ-26 C. Hao, S. Gazor, D. Orlando, G. Foglia, and J. Yang, "Parametric Space-Time Detection and Range Estimation of a small target," *IET Radar, Sonar and Navigation*, Vol. 9, No. 2, pp. 221-231, February 2015.

IJ-27 A. Aubry, A. De Maio, G. Foglia, C. Hao, and D. Orlando, "Radar Detection and Range Estimation Using Oversampled Data," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 51, No. 2, pp. 1039-1052, April 2015.

IJ-28 A. Aubry, A. De Maio, G. Foglia, and D. Orlando, "Diffuse Multipath Exploitation for Adaptive Radar Detection," *IEEE Transactions on Signal Processing*, Vol. 63, No. 5, pp. 1268-1281, May 2015.

IJ-29 A. De Maio and D. Orlando, "An Invariant Approach to Adaptive Radar Detection Under Covariance Persymmetry," *IEEE Transactions on Signal Processing*, Vol. 63, No. 5, pp. 1297-1309, May 2015.

IJ-30 C. Hao, D. Orlando, G. Foglia, X. Ma, and C. Hou, "Adaptive Radar Detection and Range Estimation with Oversampled Data for Partially Homogeneous Environment," *IEEE Signal Processing Letters*, Vol. 22, No. 9, pp. 1359-1363, 2015.

IJ-31 A. De Maio, D. Orlando, A. Farina, and G. Foglia, "Design and Analysis of Invariant Receivers for Gaussian Targets Under Covariance Persymmetry," *IEEE Journal of Selected Topics in Signal Processing*, Vol. 9, No. 8, pp. 1560-1569, December 2015.

IJ-32 C. Hao, S. Gazor, X. Ma, S. Yan, C. Hou, and D. Orlando, "Polarimetric Detection and Range Estimation of a Point-Like Target," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 52, No. 2, pp. 603-616, April 2016.

IJ-33 A. De Maio and D. Orlando, "Adaptive Radar Detection of a Subspace Signal Embedded in Subspace Structured plus Gaussian Interference Via Invariance," *IEEE Transactions on Signal Processing*, Vol. 64, No. 8, pp. 2156-2167, April 2016.

IJ-34 D. Ciuonzo, A. De Maio, and D. Orlando, "A Unifying Framework for Adaptive Radar Detection in Homogeneous plus Structured Interference-Part I: On the Maximal Invariant Statistic," *IEEE Transactions on Signal Processing*, Vol. 64, No. 11, pp. 2894-2906, June 2016.

IJ-35 D. Ciuonzo, A. De Maio, and D. Orlando, "A Unifying Framework for Adaptive Radar Detection in Homogeneous plus Structured Interference-Part II: Detectors Design," *IEEE Transactions on Signal Processing*, Vol. 64, No. 11, pp. 2907-2919, June 2016.

IJ-36 A. De Maio and D. Orlando, "A Survey on Two-stage Decision Schemes for Point-like Targets in Gaussian Interference," *IEEE Aerospace and Electronic Systems Magazine*, Vol. 31, No. 4, pp. 20-29, April 2016.

IJ-37 A. De Maio, D. Orlando, C. Hao, and G. Foglia, "Adaptive Detection of Point-like Targets in Spectrally Symmetric Interference," *IEEE Transactions on Signal Processing*, Vol. 64, No. 12, pp. 3207-3220, March 2016.

IJ-38 A. De Maio, D. Orlando, I. Soloveychik, and A. Wiesel, "Invariance Theory for Adaptive Detection in Interference with Group Symmetric Covariance Matrix," *IEEE Transactions on Signal Processing*, Vol. 64, No. 23, pp. 6299-6312, July 2016.

IJ-39 A. Aubry, V. Carotenuto, A. De Maio, and D. Orlando, "Coincidence of Maximal Invariants for Two Adaptive Radar Detection Problems," *IEEE Signal Processing Letters*, Vol. 23, No. 9, pp. 1193-1196, September 2016.

IJ-40 C. Hao, D. Orlando, G. Foglia, and G. Giunta, “Knowledge-based Adaptive Detection: Joint Exploitation of Clutter and System Symmetry Properties,” *IEEE Signal Processing Letters*, Vol. 23, No. 10, pp. 1489-1493, October 2016.

IJ-41 D. Ciuonzo, D. Orlando, and L. Pallotta, “On the Maximal Invariant Statistic for Adaptive Radar Detection in Partially-Homogeneous Disturbance with Persymmetric Covariance,” *IEEE Signal Processing Letters*, Vol. 23, No. 12, pp. 1830-1834, December 2016.

IJ-42 A. De Maio, D. Orlando, L. Pallotta, and C. Clemente, “A Multi-family GLRT for Oil Spills Detection,” *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 55, No. 1, pp. 63-79, January 2017.

IJ-43 D. Ciuonzo, A. De Maio, and D. Orlando, “On the Statistical Invariance for Adaptive Radar Detection in Partially-homogeneous Disturbance plus Structured Interference,” *IEEE Transactions on Signal Processing*, Vol. 65, No. 5, pp. 1222-1234, March 2017.

IJ-44 D. Orlando, “A Novel Noise Jamming Detection Algorithm for Radar Applications,” *IEEE Signal Processing Letters*, Vol. 24, No. 2, pp. 206-210, February 2017.

IJ-45 G. Foglia, C. Hao, D. Orlando, A. Farina, and G. Giunta, “Adaptive Detection in Partially Homogeneous Clutter with Symmetric Spectrum,” *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 53, No. 4, pp. 2110-2119, August 2017.

IJ-46 G. Foglia, G. Giunta, C. Hao, and D. Orlando, “Knowledge-Aided Adaptive Detection in Partially Homogeneous Clutter: Joint Exploitation of Persymmetry and Symmetric Spectrum,” *Elsevier Digital Signal Processing*, Vol. 67, pp. 131-138, 2017.

IJ-47 D. Orlando, C. Hao, A. Aubry, G. Cui, A. C. Gurbuz, and S. Gazor, Editorial of “Special Issue: Advanced Techniques for Radar Signal Processing,” *EURASIP Journal on Advances in Signal Processing*, June 2017.

IJ-48 V. Carotenuto, A. De Maio, D. Orlando, and P. Stoica, “Model Order Selection Rules For Covariance Structure Classification in Radar,” *IEEE Transactions on Signal Processing*, Vol. 65, No. 20, pp. 5305-5317, October 2017.

IJ-49 S. Yan, D. Orlando, C. Hao, D. Massaro, and A. Farina, “Adaptive Detection and Range Estimation of point-like targets with Symmetric Spectrum,” *IEEE Signal Processing Letters*, Vol. 24, No. 11, pp. 1744-1748, November 2017.

IJ-50 V. Carotenuto, A. De Maio, D. Orlando, and L. Pallotta, “Adaptive Radar Detection Using Two Sets of Training Data,” *IEEE Transactions on Signal Processing*, Vol. 66, No. 7, pp. 1791-1801, July 2018.

IJ-51 G. Giunta, C. Hao, and D. Orlando, “Estimation of Rician K-Factor in the Presence of Nakagami-m Shadowing for the LoS Component,” *IEEE Wireless Communications Letters*, Vol. 7, No. 4, pp. 550-553, August 2018.

IJ-52 A. De Maio, S. Han, and D. Orlando, "Adaptive Radar Detectors Based on the Observed FIM," *IEEE Transactions on Signal Processing*, Vol. 66, No. 14, pp. 3838-3847, July 2018.

IJ-53 V. Carotenuto, A. De Maio, D. Orlando, and P. Stoica, "Radar Detection Architecture based on Interference Covariance Structure Classification," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 55, No. 2, pp. 607-618, 2019.

IJ-54 L. Pallotta, A. De Maio, and D. Orlando, "A Robust Framework for Covariance Classification in Heterogeneous Polarimetric SAR Images," *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 57, No. 1, pp. 104-119, January 2019.

IJ-55 L. Pallotta and D. Orlando, "Polarimetric Covariance Eigenvalues Classification in SAR Images," *IEEE Geoscience and Remote Sensing Letters*, Vol. 16, No. 5, pp. 746-750, 2019.

IJ-56 J. Liu, D. Orlando, P. Addabbo, and W. Liu, "SINR Distribution for the Persymmetric SMI Beamformer With Steering Vector Mismatches," *IEEE Transactions on Signal Processing*, Vol. 67, No. 5, pp. 1382-1392, March 2019.

IJ-57 P. Addabbo, F. Biondi, C. Clemente, D. Orlando, and L. Pallotta, "Classification of Covariance Matrix Eigenvalues in Polarimetric SAR for Environmental Monitoring Applications," *IEEE Aerospace and Electronic Systems Magazine*, Vol. 19, No. 6, 2019.

IJ-58 F. Biondi, C. Clemente, and D. Orlando, "An Atmospheric Phase Screen Estimation Strategy Based on Multi-Chromatic Analysis for Differential Interferometric Synthetic Aperture Radar," *IEEE Transactions on Geoscience and Remote Sensing*, in print, Vol. 57, No. 9, pp. 7269-7280, September 2019.

IJ-59 L. Yan, P. Addabbo, C. Hao, D. Orlando, and A. Farina, "New ECCM Techniques Against Noise-like and/or Coherent Interferers," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 56, No. 2, pp. 1172-1188, April 2020.

IJ-60 L. Yan, C. Hao, D. Orlando, A. Farina, and C. Hou, "Parametric space-time detection and range estimation of point-like targets in PHE," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 56, No. 2, pp. 1228-1242, April 2020.

IJ-61 F. Biondi, P. Addabbo, D. Orlando, and C. Clemente, "Micro-Motion Estimation of Maritime Targets Using Pixel Tracking in COSMO-SkyMed Synthetic Aperture Radar Data - An Operative Assessment," *MDPI Remote Sensing*, in print, 2019.

IJ-62 J. Liu, F. Biondi, D. Orlando, and A. Farina, "Training Data Classification Algorithms for Radar Applications," *IEEE Signal Processing Letters*, Vol. 26, No. 10, pp. 1446-1450, October 2019.

IJ-63 V. Carotenuto, D. Orlando, and A. Farina, "Interference Covariance Matrix Structure Classification in Heterogeneous Environment," *IEEE Signal Processing Letters*, Vol. 26, No. 10, pp. 1491-1495, October 2019.

IJ-64 P. Addabbo, D. Orlando, and G. Ricci "Adaptive Radar Detection of Dim Moving Targets in Presence of Range Migration," *IEEE Signal Processing Letters*, Vol. 26, No. 10, pp. 1461-1465, October 2019.

IJ-65 F. Biondi, C. Clemente, and D. Orlando, "An Eigenvalue-based Approach for Structure Classification in Polarimetric SAR Images," *IEEE Geoscience and Remote Sensing Letters*, Vol. 17, No. 6, pp. 1003-1007, Jun 2020.

IJ-66 J. Liu, W. Liu, B. Tang, and D. Orlando, "Persymmetric Adaptive Detection in Subspace Interference Plus Gaussian Noise," *Signal Processing*, Vol. 167, February 2019.

IJ-67 F. Biondi, A. Tarpanelli, P. Addabbo, C. Clemente, and D. Orlando, "Pixel Tracking to Estimate Rivers Water Flow Elevation Using Cosmo-SkyMed SAR data," *MDPI Remote Sensing*, in print, 2019.

IJ-68 P. Addabbo, O. Besson, D. Orlando, and G. Ricci, "Adaptive Detection of Coherent Radar Targets in the Presence of Noise Jamming," *IEEE Transactions on Signal Processing*, Vol. 67, No. 24, pp. 6498-6510, December 2019.

IJ-69 J. Liu, W. Liu, C. Hao, and D. Orlando, "Persymmetric Subspace Detectors With Multiple Observations in Homogeneous Environments," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 56, No. 4, pp. 3276-3284, August 2020.

IJ-70 F. Biondi, P. Addabbo, C. Clemente, and D. Orlando, "Measurements of Surface River Doppler Velocities with Along-Track InSAR Using a Single Antenna," *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, Vol. 13, pp. 987-997, March 2020.

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