

Professor Angelo Onorati

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Education:

Graduated "cum laude" in Mechanical Engineering at Politecnico di Milano in 1989, discussing a thesis about the modeling of turbocharged I.C. engines.

PhD in "Energy Engineering" in 1993 at Politecnico di Milano; the thesis work was focused on the simulation of the gas dynamic behavior of I.C. engine silencers. During the PhD he spent a research stay at the University of Manchester Institute of Science and Technology (UMIST) and the Institute of Sound and Vibration Research (ISVR) at Southampton (GB).

Main steps in academic career and work experiences:

Lecturer at the Department of Energy of Politecnico di Milano ("Fluid Machines" field) from 1993 to 1998.

Associate Professor in the same department from 1998 to 2003.

Full Professor of "Fluid Machines" since January 2004.

He gives lectures in the course of "Fluid Machines" (150 students) at the 3rd year of the BSc in Energy Engineering, and in the courses of "Internal Combustion Engines" (90 students) at MSc level (Energy Engineering), last year.

He currently coordinates the research activity of the ICE Group at the Department of Energy: 4 professors, 2 assistant professors, 9 PhD students and post-docs. The research group is involved in several research projects with universities and industries, mainly in the field of IC engines and Fluid Machines in general. He is the tutor of 5 PhD students and 10 MSc thesis per year.

He develops and coordinates the evolution of an integrated 1D-3D thermo-fluid dynamic model (GASDYN-OpenFOAM) for the simulation of I.C. engines, to calculate the unsteady reacting flows in the intake and exhaust systems (including catalytic converters, particulate filters and silencers), and the combustion process in Otto, Diesel and HCCI engines.

He started many research collaborations with universities and automotive companies for the application and enhancement of the 1D-3D thermo-fluid dynamic codes developed by the research group.

He has been the scientific coordinator of research projects financed by the Ministry of Education (FIRB), the Ministry of Industry (Industria 2015), the European Community (LESSCCV - FP7, VISION_xEV - H2020), concerning advanced CFD simulation techniques for innovative vehicle I.C. engines.

He is the author of more than 140 publications reported on Scopus, with 1500 citations and h-index=22.

Personal skills and research interests:

His research interests are concerned with the modeling of internal combustion engines by means Gasdyn (1D code) and OpenFOAM (multidimensional CFD code).

Thermo-fluid dynamic modeling of unsteady reacting flows in the duct-systems of I.C. engines.

CFD simulation of after-treatment systems for I.C. engines: catalytic converters, particulate filters.

CFD modeling of silencers and prediction of tailpipe noise emitted by I.C. engines.

Study of advanced combustion processes in I.C. engines fuelled with natural gas, hydrogen, bio-fuels.

Modeling of downsized, turbo-charged engines.

Integrated 1D-3D thermo-fluid dynamic simulation of I.C. engines.

Awards:

In April 2011 he received the Lloyd L. Withrow distinguished speaker SAE award.

Responsibilities:

Member of the Editorial Board of the International Journal of Engine Research.

Associate Editor of the Editorial Board of the SAE International Journal of Engines.

Organizer of the session "Modeling of S.I. and Diesel Engines" of the SAE World Congress.

Member of the scientific committee of the THIESEL International Conference on Diesel engines, held in Valencia (Spain) every two years.

Member of the scientific committee of the SAE ICE International Conference, held in Capri (Naples – Italy) every two years.

Coordinator of the Erasmus/Time international student programs for Energy Engineering.

Member of the PhD departmental committee.

Member of the faculty international committee.

Memberships:

Member of SAE (Society of Automotive Engineers).

Member of SAE-Naples Governing Board.

He is involved in the editorial board of the IJER (international Journal of Engine Research) and the SAE Int. Journal of Engines.

Selected Publications:

- Paredi, D., Lucchini, T., D'Errico, G., Onorati, A., Pickett, L., Lacey, J., Validation of a comprehensive computational fluid dynamics methodology to predict the direct injection process of gasoline sprays using Spray G experimental data. (2020) *International Journal of Engine Research*, 21 (1), pp. 199-216.
- Della Torre, A., Montenegro, G., Onorati, A., Cerri, T., Tronconi, E., Nova, I., Numerical Optimization of a SCR System Based on the Injection of Pure Gaseous Ammonia for the NO_x Reduction in Light-Duty Diesel Engines. (2020) *SAE Technical Papers*, 2020-April.
- Reitz, R.D., Ogawa, H., Payri, R., Fansler, T., Kokjohn, S., Moriyoshi, Y., Agarwal, A.K., Arcoumanis, D., Assanis, D., Bae, C., Boulouchos, K., Canakci, M., Curran, S., Denbratt, I., Gavaises, M., Guenther, M., Hasse, C., Huang, Z., Ishiyama, T., Johansson, B., Johnson, T.V., Kalghatgi, G., Koike, M., Kong, S.C., Leipertz, A., Miles, P., Novella, R., Onorati, et. al. ...
IJER editorial: The future of the internal combustion engine. (2020) *International Journal of Engine Research*, 21 (1), pp. 3-10.
- Montenegro, G., Tamborski, M., Marinoni, A., Della Torre, A., Onorati, A., Marelli, S., A quasi 3D approach for the modelling of an automotive turbocharger's compressor. (2019) *AIP Conference Proceedings*, 2191, art. no. 020113.
- Della Torre, A., Montenegro, G., Onorati, A., Cerri, T., CFD Investigation of the Impact of Electrical Heating on the Light-off of a Diesel Oxidation Catalyst. (2018) *SAE Technical Papers*.
- Lucchini, T., Della Torre, A., D'Errico, G., Onorati, A., Maes, N., Somers, L.M.T., Hardy, G., A comprehensive methodology for computational fluid dynamics combustion modeling of industrial diesel engines. (2017) *International Journal of Engine Research*, 18 (1-2), pp. 26-38.
- Della Torre, A., Lucci, F., Montenegro, G., Onorati, A., Dimopoulos Eggenschwiler, P., Tronconi, E., Groppi, G., CFD modeling of catalytic reactions in open-cell foam substrates. (2016) *Computers and Chemical Engineering*, 92, pp. 55-63.
- Della Torre, A., Montenegro, G., Onorati, A., CFD investigation of the effect of fluid-structure interaction on the transmission loss of ICE silencers. (2016) *SAE International Journal of Passenger Cars - Mechanical Systems*, 9 (3),
- Zhu, X., Sforza, L., Ranadive, T., Zhang, A., Lee, S.-Y., Naber, J., Lucchini, T., Onorati, A., Anbarasu, M., Zeng, Y., Experimental and Numerical Study of Flame Kernel Formation Processes of Propane-Air Mixture in a Pressurized Combustion Vessel. (2016) *SAE International Journal of Engines*, 9 (3).
- Montenegro, G., Cerri, T., Torre, A., Onorati, A., Fiocco, M., Borghesi, D., Fluid dynamic optimization of a moto3™ engine by means of 1D and 1D-3D simulations. (2016) *SAE International Journal of Engines*, 9 (1), pp. 596-608.
- Martínez, J., Piscaglia, F., Montorfano, A., Onorati, A., Aithal, S.M., Influence of momentum interpolation methods on the accuracy and convergence of pressure-velocity coupling algorithms in OpenFOAM®. (2015) *Journal of Computational and Applied Mathematics*.
- Cheng, W.K., Onorati, A., Editorial: Biofuels in internal combustion engines. (2015) *International Journal of Engine Research*, 16 (5), p. 609.
- Stockar, S., Canova, M., Guezennec, Y., Della Torre, A., Montenegro, G., Onorati, A., Model-order reduction for wave propagation dynamics in internal combustion engine air path systems. (2015) *International Journal of Engine Research*, 16 (4), pp. 547-564.
- D'Errico, G., Lucchini, T., Onorati, A., Hardy, G., Computational fluid dynamics modeling of combustion in heavy-duty diesel engines. (2015) *International Journal of Engine Research*, 16 (1), pp. 112-124.