

CURRICULUM VITAE

DATI GENERALI

Prof.ssa Stefania Falfari

Professoressa Associata di Macchine a Fluido

- 1999 – Laurea in ingegneria Meccanica, conseguita presso l’Università degli Studi di Bologna;
- 2000 - 2003 – Dottorato di ricerca con stage di 6 mesi presso l’Engine Research Center di Madison, Wisconsin. Titolo della tesi: “Sviluppo di metodologie per la simulazione di iniettori ad alta pressione e ad alta velocità di attuazione”;
- 2005 – Ricercatrice presso l’Università di Bologna;
- 2021 – Professoressa Associata presso l’Alma Mater Studiorum di Bologna.

ELENCO DELLE PUBBLICAZIONI

CONVEGNI INTERNAZIONALI

- [1] Bianchi, G.M., Falfari, S., Pelloni, P., Filicori, F., Milani, M., “Development of a Dynamic Model for Studying the 1st Generation of Common Rail Injectors for HSDI Diesel Engines”. SAE Technical Paper 2001-24-0013, 2001, doi:10.4271/2001-24-0013. 5th International Conference ICE 2001, September 2001, Capri.
- [2] Bianchi, G.M., Pelloni, P., Falfari, S., Brusiani, F., Osbat, G., Parotto, M., Di Gioia, R., “The Role of Simulation in the Development of a Fast-Actuation Solenoid C.R. Injection System”, *Proc. ASME*. 37467; ASME 2004 Internal Combustion Engine Division Fall Technical Conference:277-284. January 01, 2004, ASMECP002004037467000277000001; doi: 10.1115/ICEF2004-0847.
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- [4] Falfari, S., Bianchi, G.M., “Development and Validation of an Ignition Model for SI Engines”, ICES2006-1432, ASME Internal Combustion Engine Division 2006 Spring Technical Conference, May 7-10, 2006, Aachen, Germany. ICES2006-1432 pp. 487-498; 12 pages. doi: 10.1115/ICES2006-1432
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- [6] S. Falfari, P. Pelloni, "Setup of a 1D Model for Simulating Dynamic Behaviour of External Gear Pumps", SAE paper 2007-01-4228, SAE Commercial Vehicle Engineering Congress & Exhibition 2007, November 2007, Chicago, USA.
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- [10] Falfari, S., Brusiani, F., and Bianchi, G., "Assessment of the Influence of Intake Duct Geometrical Parameters on the Tumble Motion Generation in a Small Gasoline Engine," SAE Technical Paper 2012-32-0095, 2012, doi:10.4271/2012-32-0095.
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Published Online: 17 December 2019.
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- [34] Stefania Falfari, Gian Marco Bianchi, Giulio Cazzoli, Claudio Forte, "Thermal Efficiency Enhancement for Future Rightsized Boosted GDI Engines – Effectiveness of the Operation Point Strategies Depending on the Engine Type", 15th International Conference on Engines & Vehicles, SAE Technical Paper 2021-24-0009.

ARTICOLI SU RIVISTA

- [1] Bianchi, G.M., Falfari, S., Pelloni P., Song-Chang Kong, Reitz, R.D., "Numerical Analysis of High-Pressure Fast-Response Common Rail Injector Dynamics", SAE 2002-01-0213, March 2002, *SAE 2002 Transactions- SAE Journal of Engines, Vol.111, pp.545-561, settembre 2003*.
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- [14] Mariani, V.; Pulga, L.; Bianchi, G.M.; Falfari, S.; Forte, C., Machine Learning-Based Identification Strategy of Fuel Surrogates for the CFD Simulation of Stratified Operations in Low Temperature Combustion Modes. *Energies* 2021, 14, 4623. <https://doi.org/10.3390/en14154623>.

ATTIVITÀ SCIENTIFICA

- Le attività di ricerca sono state svolte all'interno di **due macro-ambiti** riguardanti:
 1. la simulazione termofluidodinamica numerica tridimensionale di sistemi di combustione dei motori endotermici alternativi:
 - i. Studio per via numerica di sistemi innovativi volti al contenimento delle emissioni inquinanti in motori diesel.
 - ii. Studio della simulazione della turbolenza in motori endotermici alternativi.
 - iii. Sviluppo di modelli di combustione per motori ad accensione comandata.
 - iv. Studio di sistemi di combustione di motori ad accensione comandata con iniezione di acqua.
 - v. Sviluppo ed integrazione di solutori chimici e tecniche di Machine Learning per la previsione delle proprietà chimiche di miscele reagenti in simulazione termofluidodinamiche di motori.
 - vi. Implementazione di tecniche di Machine Learning per la previsione della dipendenza dei coefficienti di diffusione in fase liquida tra olio e benzina dalle forze intermolecolari.
 2. la simulazione idraulica mono- e tridimensionale di sistemi di iniezione di combustibile ad alta pressione:
 - i. Si è occupata di sviluppare metodologie numeriche avanzate 1D-3D per lo studio e la progettazione di sistemi di iniezione Common Rail per motori a ciclo Diesel. Inoltre, ha studiato la fenomenologia e le cause di instabilità presenti nei sistemi di iniezione operanti con strategia di iniezione multipla. Infine, ha sviluppato una metodologia di simulazione numerica del flusso multi-fase in condizioni cavitanti allo scopo di migliorare la previsione delle condizioni di flusso bi-fase negli ugelli di iniettori ad alta pressione per applicazioni motoristiche.
- Sfruttando l'applicazione di tecniche, metodologie e risultati derivanti da questi due macro-ambiti, nelle attività di ricerca sono presenti **due ulteriori filoni** riguardanti lo studio per via numerica del flusso bifase in forcelle motociclistiche e lo studio per via numerica delle condizioni di flusso in schiume aperte per future applicazioni su catalizzatori per impieghi automobilistici.