

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" 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 six months 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 courses of "Hydraulic and Thermal Machines" and "Internal Combustion Engines".

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 is the scientific coordinator of research projects financed by the Ministry of Education (FIRB), the Ministry of Industry (Industria 2015), the European Community, concerning advanced simulation techniques for innovative vehicle I.C. engines.

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.

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.

Responsibilities:

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

Secretary of I° and II° level degree exams for Energy Engineering. Member of the faculty degree committee.

Secretary of the Board for Studies in Energy Engineering.

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.

Reviewer for the following scientific journals:

Progress in Energy and Combustion Science

International Journal for Numerical Methods in Engineering

Computer Physics Communications

Journal of Automobile Engineering

International Journal of Engine Research

International Journal of Vehicle Design

International Journal of Hydrogen Energy

Memberships:

Member of SAE (Society of Automotive Engineers).

Member of SAE-Naples Governing Board.

Member of IIAV (International Institute of Acoustics and Vibration)

Awards:

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

Selected Publications:

G. Montenegro, A. Della Torre, A. Onorati, A. J. Torregrosa, The 3DCell Approach for the Acoustic Modeling of After-Treatment Devices. SAE Paper 2011-24-0215, ICE2011, 10th International Conference on Engines and Vehicles, September 13th-18th, Capri (Naples), 2011. SAE Int. J. Engines August 2011, 4:2519-2530, doi:10.4271/2011-24-0215.

A. Onorati, G. D'Errico, T. Lucchini, G. Montenegro, F. Piscaglia, Development of a multi-dimensional tool for the simulation of the combustion and in-cylinder flows using the OpenFOAM technology. 11th Stuttgart International Symposium on Automotive and Engine Technology, Stuttgart (Germany), 22-23 February 2011.

F. Piscaglia, A. Montorfano, A. Onorati, Multi-dimensional computation of compressible reacting flows through porous media to apply to Internal Combustion Engine simulation. Mathematical and Computer Modelling, vol. 52 (2010), pp. 1133-1142, 2010.

G. D'Errico, A. Onorati, S. Ellgas, 1D thermo-fluid dynamic modelling of an S.I. single-cylinder H2 engine with cryogenic port injection. International Journal of Hydrogen Energy 33 (2008) 5829–5841.

G. Montenegro, A. Onorati, Modeling of Silencers for I.C. Engine Intake and Exhaust Systems by means of an Integrated 1D-multiD Approach. SAE 2008 Int. Congress & Exp. (Detroit, Michigan), April 14-17, 2008, paper n. 2008-01-0677. SAE Int. J. Engines 1(1): 466-479, 2008.

G. Montenegro and A. Onorati, 1D thermo-fluid dynamic modelling of de-NOx SCR systems for diesel engine exhaust gas after-treatment, Int. Journal of Vehicle Design, Vol. 41, Nos. 1/2/3/4, 2006.

G. D'Errico and A. Onorati, Thermo-fluid dynamic modelling of a six-cylinder SI engine with a secondary air injection system. Int. J. Engine Research, Vol. 7, 7(JER1), 1 16, 2006.

A. Onorati, T. Cerri, M. Ceccarani, D. Cacciatore, Experimental Analysis and 1D Thermo-Fluid Dynamic Simulation of a High Performance Lamborghini V10 S.I. Engine. ICE2005 – SAE International Conference on Internal Combustion Engines, Capri (Naples – Italy), SAE paper n. 2005-24-081, September 14-19, 2005.

A. Onorati, G. Ferrari, G. D'Errico, Secondary Air Injection in the Exhaust After Treatment System of S.I. Engines: 1D Fluid Dynamic Modeling and Experimental Investigation. SAE Int. Congress & Exp. (Detroit, Michigan) 2003, paper n. 2003-01-0366, March 3-6, Detroit (MI), 2003. SAE Transactions, Journal of Engines, Vol. 112-3, pp. 544-555, September 2004.