AUGUSTO DELLA TORRE

Curriculum of Scientific and Research Activities

PERSONAL INFORMATION:

- Augusto Della Torre
- Born in Sondrio (SO) the 30th May 1985
- Lives in Berbenno di Valtellina (SO), via Perlegia, 34
- Current employment: Senior temporary researcher (RTDb) at Dept. of Energy, Politecnico di Milano
- Office address: Politecnico di Milano, Dept. of Energy, Via Lambruschini 4, 20156 Milano
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EDUCATION:

- **2013:** PhD in Energy and Nuclear Science and Technology at Politecnico di Milano.
  Thesis title: Multi-scale CFD modelling of intake and exhaust systems for Internal Combustion Engines. Mark: Lode.

- **2009:** Master of Science Degree in Mechanical Engineering at Politecnico di Milano.
  Thesis title: Condizioni al contorno per la modellazione fluidodinamica 1D/3D dei motori a combustione interna. Mark: 110L/110.

- **2007:** Bachelor of Science Degree in Mechanical Engineering at Politecnico di Milano.
  Thesis title: I difetti degli acciai colati in lingotti. Mark: 110L/110.

- **2004:** Diploma at Liceo Classico G. Piazzi di Sondrio. Mark: 100/100.

ACADEMIC CARRIER:

- **January 2013 – September 2015**: Temporary Research Assistant at Politecnico di Milano, Department of Energy, Internal Combustion Engine Group.

- **October 2015 – Today:** Temporary Junior Researcher (RTDa) at Politecnico di Milano, Department of Energy, Internal Combustion Engine Group.

- **February 2018:** Qualification to become Associate Professor in Fluid Machines and Systems for the Energy and the Enviroment (Abilitazione Scientifica Nazionale a professore di seconda fascia nel settore Macchine e Sistemi per l'Energia e l'Ambiente)

DIDACTIC ACTIVITY:

Chair of bachelor course:

- Macchine e Sistemi Energetici (*Bachelor Degree, 7 CFU*) for academic years 2017-18, 2018-19, 2019-20

Chair of master course:

- Modeling of Automotive Propulsion Systems (*Master Degree, 4 CFU*) for academic year 2019-20

Teaching assistant in bachelor, master and PhD courses:

- Motori a Combustione Interna (*Bachelor Degree, 7.5 CFU*) for academic year 2010-11
- Sistemi Energetici (*Bachelor Degree, 5 CFU*) for academic year 2010-11
- Laboratorio di Energetica (*Bachelor Degree, 5 CFU*) for academic years 2010-11, 2013-14
- Motori a Combustione Interna (*Master Degree, 10 CFU*) for academic year 2013-14
- Macchine (*Bachelor Degree, 10 CFU*) for academic years 2014-15, 2015-16, 2016-17
- Modeling techniques for fluid machines (*Master Degree, 10 CFU*) for academic years 2014-15, 2015-16, 2016-17, 2017-18
- Fluid Machines for Low Carbon Technologies (*Master Degree, 5 CFU*) for academic years 2016-17, 2017-18
- Computational fluid-dynamics with open-source software (*PhD Degree, 5 CFU*) for academic years 2015-16, 2016-17

Supervisor / co-supervisor of thesis:

- master thesis: > 20
- PhD thesis: 2

RESEARCH ACTIVITY:

The research activity of Augusto Della Torre is focused on the numerical modelling of the thermo/fluid-dynamic processes occurring in volumetric thermal machines (Internal Combustion Engines, Stirling machines, volumetric expanders). He developed and applied different simulation approaches, characterized by different approximation levels, including 1D, quasi-3D and CFD models. Hereafter his main research topics are described in details:

- ***Acoustics and wave actions inside intake and exhaust systems***

His work in this field was focused on the development of numerical models for the simulation of wave propagation in pipe systems, to achieve performance optimization in terms of acoustics and engine power output. Within this field he developed a quasi 3D solver in the research code Gasdyn (developed by the Internal Combustion Engine group since 1990) in order to improve the predictivity when complex geometries are involved. This quasi 3D approach was named "3Dcell" and is based on the reconstruction of the 3D shape by means of a network of 0D volumes (cells) connected by 1D element (ports) arbitrarily oriented in space. This orientation has allowed the solution of 3D momentum balances exploiting the sum of 1D contributions in each direction. To solve this problem, he implemented a particular numerical strategy: a staggered leapfrog method projected onto a staggered grid arrangement, to allow for second order accuracy both in space and time. This approach has been fully validated in different papers [20, 21, 23, 34-37, 39] and was also implemented in the commercial code AVL Boost during a three year project. To further extend the application field, he developed a Riemann based coupling strategy in order to couple the quasi3D solver to the 1D code. This has allowed the possibility of modeling the entire engine configuration with a 1D approach, capturing only locally the effects of complex shapes [20, 34, 35]. The approach has been also implemented in the open-source CFD code OpenFOAM as an additional solver to be adopted for coupled 1D/3D simulations of the entire engine. Moreover, on the basis of the OpenFOAM library, an automatic cell-network generator has been developed to speed-up the pre-processing phase [2].

- ***Novel catalytic substrates for after-treatment systems***

His work in this field focused on the study of the open-cell foam substrates for catalysis applications. His research activity involves the simulation of flow through the micro-structure of open-cell foams, applying methodologies based on micro-CT scanning and Image Based Meshing for the reconstruction of the actual geometry of the micro-structure and the generation of the CFD computational grid. This approach was applied for the characterization of the permeability and heat-transfer properties of open-cell foam substrates and filtering media [18, 38, 39, 43]. Moreover, in order to study the reactive phenomena at the small scale, he developed in OpenFOAM detailed surface reaction models, capable of handling both the kinetic and mass transfer problems when chemical reactions occur [7]. This method allows the modeling of steady state or unsteady chemical reactions, accounting for the coupling with the energy balance of the substrate. This approach was developed within the framework of a national funded project (IFOAMS) aiming at demonstrating possible advantages in employing open-cell foam substrates for catalysis applications [3, 6, 9, 14, 17]. As a latest advancement, the CFD approach was adopted to design and optimize polyhedral open-cell lattice. These substrates were then manufactured out of Al_2O_3 using Additive Manufacturing (AM) techniques. After being coated, these were finally used for measurements of C_3H_6 oxidation in a model gas reactor, allowing to directly evaluate the improved performances of these CFD-designed artificial substrates [1].

- ***CFD modeling approaches for the simulation of modern after-treatment systems***

His research effort in this field aims to the development of numerical tools for the simulation of the latest technologies applied in the modern after-treatment systems (ATS). In particular, the modeling activity focuses on the devices which have been progressively introduced on the Diesel and gasoline exhaust lines as a response to the more and more restrictive legislation, e.g: SRC, DOC, NOx-trap, DPF/GPF, electrical heating. Moreover, novel strategies have been investigated to allow the possibility to consider the recent, more complex and realistic, measurement procedures for the pollutant emissions (WLTP and RDE cycle). In this context, he developed in OpenFOAM an advanced framework to perform full-scale simulation of the ATS, considering the effects of thermal transient which strongly influences the emission level at the cold start. The approach [2] is based on a multi-region approach, where overlapping meshes, describing fluid and solid regions, are employed in order to model the presence of porous substrates. Specific models are implemented in order to couple fluid and solid regions in terms of heat-transfer and mass-transfer. Catalytic reaction model is introduced in order to describe the chemical surface reactions occurring on the washcoat of the porous substrate. The approach was developed in the framework of an European funded project (THOMSON), aiming to the development and optimization of an mild-hybrid 48V powertrain as a cost effective solution for CO_2 reduction. In this project, the candidate evaluated the impact of some novel solutions to improve the efficiency of the after-treatment system, such as: a) electrical heated catalyst and b) injection of gaseous ammonia in a SRC system instead of the standard urea water solution spray injection.

- ***Automatic mesh generation strategies for in-cylinder simulation***

In the field of the simulation of in-cylinder phenomena, he developed innovative meshing strategies aimed to the fully automatic generation of high-quality computational grids to be applied for the simulation of direct-injection engines. In particular, the proposed approaches were specifically developed for two types of internal combustion engine simulations: a) simulation of Diesel combustion chambers, b) full-cycle simulation accounting for the gas exchange phases. These methodologies represent a compromise between manual and automatic approaches aiming at the following three goals: reduction of meshing time, achievement of high-quality meshes, limited interaction with the user. These approaches were applied and validated onto industrial and research engine configurations [4, 27, 28].

- ***Waste heat recovery ORC systems***

In the field of the thermal management of exhaust systems he worked on the development of a simulation framework to model waste heat recovery systems. In particular, his focus was the modeling of the volumetric expander, which usually has a rotary architecture. Therefore, he developed a moving mesh strategy based on the automatic generation of calculation grids for volumetric machines, which can be applied to sliding vane rotary machines, but also to scroll compressors/expanders, Wankel engines, or Stirling cycle engines. This technique is based onto the parallel motion of a surface representation of the device and of the mesh itself. The mesh motion is realized resorting to algorithms already present in the OpenFOAM code, based on the boundary motion and on its diffusion to the inner grid. When the grid quality decreases excessively, the surface file is deformed in order to overlap the last valid boundary position of the mesh and then used to generate a valid mesh for the new position. The solution field is mapped from the old mesh to the new one and the calculation continue. This approach removes the limit of having all the meshes ready before the simulation, and allows to use the minimum number of

grids compatible with grid quality indexes. Moreover, since the ORC expander elaborates an organic fluid close to critical conditions, he developed in OpenFOAM specific classes to handle the real gas behavior. To this purpose, he implemented the possibility of modeling real gas volumetric (Peng Robinson and the Redlich-Kwong-Soave equations) and thermodynamic (Helmholtz potential) behavior [31, 32].

- ***Stirling machines***

His research activity in this field concerns the development and implementation of CFD modelling approaches and their applications to the design of innovative solutions. In particular, on the basis of the OpenFOAM code, he implemented a library for the simulation of Stirling engines, including standard piston-based configurations (Alpha, Beta, Gamma) and innovative rotary architectures. In particular, specific mesh motion strategies were implemented for describing the motion of the different components (piston, displacer, or rotors). Moreover, suitable models were developed for the modelling of the pressure drop and the heat transfer in the heat exchangers and the regenerator. The simulation library was validated on a standard Beta-type configuration and was applied to perform a parametric study on the design parameters of the machine, aiming to the optimization of the different components [30]. Moreover, the research activity is focused on the development of novel and more efficient machine concepts. In particular, he recently proposed the design of a novel concept of Stirling machine based on a rotary architecture in order to improve different crucial aspects of standard machines [26]. In particular, the proposed Stirling machine is characterized by a higher compactness, higher specific power and better efficiency with respect to the state-of-the-art Stirling machines. Furthermore, the possibility to operate with a two-phase working fluid allows to exploit low temperature heat sources, making it suitable for waste heat recovery applications. For this concept an Italian national patent has been obtained (patent number 0001427088).

- ***Multiphase simulation of transmissions***

As a result of an increasing interest from the industry, he extended the developments for the automatic mesh motion to the case of gears and transmissions. The interest for this type of modeling is driven by the need of achieving global efficiencies in engines as much high as possible, considering also the mechanical power loss that occurs in transmissions. The approach is based onto both the frozen rotor approach, in the case of single gears, and moving mesh approach when there are several gears. A validation has been performed and published on journal articles [12, 15, 16].

- ***Pore-scale CFD simulation of oil & gas reservoir***

He extended the numerical techniques developed for the study of open-cell foam subtrates also in the field of the so called Digital Rock Physics, adopted for the petrophysical characterization of oil & gas reservoir. In particular, the focus of the research is the study of the physical phenomena occurring at the pore-scale in tight rocks reservoir in order to characterize the properties of the media and to enhance the understanding of the fluid-dynamics phenomena occurring at this scale. He applies a methodology based on the adoption of micro computer tomography (micro-CT) techniques in order to determine the micro-structural geometry of the rocks [5]. In particular, his research is focused on: a) the development of automatic techniques for the processing and segmentation of the 3D images, b) the development of fast and reliable meshing tools working on

the image dataset, c) the implementation of physical models for the simulation of single-phase and multi-phase flows.

- ***Towards novel techniques for the simulation of complex volumetric machines***

He recently started to investigate the potential application of particle-based numerical techniques for the simulation of volumetric machines. In particular, among particle-based methods, he is focusing on Smoothed Particle Hydrodynamics (SPH), which seems to have interesting advantages in terms of: a) capability of handling complex boundary motions; b) simplicity of the pre-processing phase due to its meshless nature; c) possibility to reduce the computational time by means of massive parallelization on Graphical Processing Units (GPU). First publication on this topic is expected by the end of the current year.

PARTECIPATION IN FUNDED PROJECTS:

Projects funded by national / international public institutions:

- January 2010 - April 2012: **INDUSTRIA 2015 - Mobilità sostenibile "MUSS - Mobilità Urbana ed Infraurbana Sostenibile e Sicura".** Source: *Ministero dello Sviluppo Economico.* Proponents: *Piaggio S.p.A., Magneti Marelli Powertrain S.p.A., University of Pisa, University of Napoli, University of Padova, Politecnico di Milano, Consorzio COMETA, University of Roma "Tor Vergata", RE:Lab, University of Firenze, Alma Automotive, ENEA, CNR, Comitato Elettrotecnico Italiano*. The research project aimed at the development of innovative solution for the efficiency and the sustainability of two-wheels vehicles.

- April 2013 - April 2016: **PRIN 2012 "IFOAMS - Intensification of Catalytic Processes for Clean Energy, Low-Emission Transport and Sustainable Chemistry using Open-Cell Foams as Novel Advanced Structured Materials"**. Source: *Ministero dell'Istruzione, dell'Università e della Ricerca.* Proponents*: Politecnico di Milano, Politecnico di Torino, University of Bologna, University of Salento, MUSP - Macchine Utensili e Sistemi di Produzione.* The project focused on the application of open-cell foams as catalytic substrates, investigating the potential of this innovative solution to enhance the conversion efficiency of the after-treatment devices.

- October 2016 - October 2019: **HORIZON 2020 "THOMSON - Mild Hybrid cOst effective solutions for a fast Market penetratiON"**. Source: *EU*. Proponents: *Centro Ricerche Fiat (CFR), Ford, Bosch, Continental, Emitech, Faurecia, BorgWarner, Ricardo, Schaeffler, Politecnico di Milano, University of Bath, University of Berlin.* The project aims at the development and optimization of an hybrid 48V powertrain as a cost effective solution to reduce CO2 and pollutant emissions of light-duty engines.

Scientific contracts and collaborations with private companies:

- AVL List GmbH (2010-2011: 2 projects)
- Magna Powertrain (2011-2015: 3 projects)
- Eni (2014-today: 2 projects)
- FPT Industrial (2014-today)
- Ferrari (2016)
- Lafranconi (2016)
- Volvo Technology (2017)
- UFI Filters (2017-2019)
- Costamp Tools (2018-2019)

PUBLICATIONS:

Bibliometric indices (Scopus database, December 2019):

- indexed documents: 44

- total citations: 340

- h-index: 11

Journal Papers:

1. V. Papetti, P. Dimopoulos Eggenschwiler, A. Della Torre, F. Lucci, A. Ortona, G. Montenegro, "Additive Manufactured open cell polyhedral structures as substrates for automotive catalysts", (2018) International Journal of Heat and Mass Transfer 126 (2018) 1035–1047.
2. A. Della Torre, G. Montenegro, T. Cerri, A. Onorati, "A 1D/Quasi-3D Coupled Model for the Simulation of I.C. Engines: Development and Application of an Automatic Cell-Network Generator", (2017) SAE International Journal Of Engines, vol. 10, p. 471-482, ISSN: 1946-3944, doi:10.4271/2017-01-0514.
3. S. Falfari, G.M. Bianchi, G. Micci, A. Della Torre, G. Montenegro, A. Onorati, S. Negro, "Geometric and Fluid-Dynamic Characterization of Actual Open Cell Foam Samples by a Novel Imaging Analysis Based Algorithm", (2017) SAE International Journal Of Engines, vol. 10, p. 1-13, ISSN:1946-3944, doi: 10.4271/2017-01-9288.
4. T. Lucchini, A. Della Torre, G. D'Errico, A. Onorati, N. Maes, L.M.T. Somers, G. Hardy, "A comprehensive methodology for computational fluid dynamics combustion modeling of industrial Diesel engines", (2017) International Journal Of Engine Research, vol. 18, p. 26-38, ISSN: 1468-0874, doi: 10.1177/1468087416679570.
5. I. Verri, A. Della Torre, G. Montenegro, A. Onorati, S. Duca, C.A. Mora, F. Radaelli, G. Trombin, "Development of a Digital Rock Physics workflow for the analysis of sandstones and tight rocks", (2017) Journal Of Petroleum Science And Engineering, vol. 156, p. 790-800, ISSN: 0920-4105, doi: 10.1016/j.petrol.2017.06.053.
6. F. Lucci, A. Della Torre, G. Montenegro, R. Kaufmann, P. Dimopoulos Eggenschwiler, "Comparison of geometrical, momentum and mass transfer characteristics of real foams to Kelvin cell lattices for catalyst applications", (2017) International Journal Of Heat And Mass Transfer, vol. 108, p. 341-350, ISSN: 0017-9310, doi: 10.1016/ j.ijheatmasstransfer.2016.11.073.
7. Della Torre A., Lucci F., Montenegro G., Onorati A., Dimopoulos Eggenschwiler P., Tronconi E., Groppi G. (2016), "CFD modeling of catalytic reactions in open-cell foam substrates. Computers & Chemical Engineering" (2016), vol. 92, p. 55-63, ISSN: 0098-1354, doi:10.1016/j.compchemeng.2016.04.031.

8. Montenegro G., Cerri T., Della 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, vol. 9, p. 596-608, ISSN: 1946-3936, doi: 10.4271/2016-01-0570.

9. Falfari S., Micci G., Bianchi G.M., Brusiani F., Montenegro G., Della Torre A., Onorati A. “Design of catalytic devices by means of genetic algorithm: Comparison between open-cell foam and honeycomb type substrates”, (2016) SAE International Journal Of Engines, vol. 9, p. 1686-1695, ISSN: 1946-3936, doi: 10.4271/2016-01-0965.

10. Montenegro G, D'Errico G., Della Torre A., Cadei L., Masi S., “Slug catcher multiphase CFD modeling: Optimization and comparison with industrial standards” (2016) Journal Of Applied Fluid Mechanics, vol. 9, p. 1-9, ISSN: 1735-3645.

11. 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, vol. 9, p. 1063-1070, ISSN: 1946-3995, doi:10.4271/2016-01-1815.

12. Concli F., Della Torre A., Gorla C., Montenegro G., “A New Integrated Approach for the Prediction of the Load Independent Power Losses of Gears: Development of a Mesh-Handling Algorithm to Reduce the CFD Simulation Time”, (2016) Advances In Tribology, vol. 2016, p. 1-8, ISSN: 1687-5915, doi:10.1155/2016/2957151.

13. 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, vol. 16, p. 547-564, ISSN: 1468-0874, doi: 10.1177/1468087414537730.

14. F. Lucci, A. Della Torre, G. Montenegro, P. Dimopoulos Eggenschwiler, “On the catalytic performance of open cell structures versus honeycombs”, (2015) Chemical Engineering Journal, 264, pp. 514-521.

15. Concli, F., Gorla, C., Della Torre, A., Montenegro, G. “Churning Power Losses of Ordinary Gears: A New Approach Based on the Internal Fluid Dynamics Simulations” (2015) Lubrication Science, vol. 27, p. 313-326, ISSN: 0954-0075, doi:10.1002/ls.1280.

16. Concli, F., Gorla, C., Della Torre, A., Montenegro, G. “Windage Power Losses of Ordinary Gears: Different CFD Approaches Aimed to the Reduction of the Computational Effort”. Lubricants 2014, 2, pp.162-176.

17. Lucci, F., Della Torre, A., Von Rickenbach, J., Montenegro, G., Poulikakos, D., Dimopoulos Eggenschwiler, P. “Performance of Randomized Kelvin Cell Structures as Catalytic Substrates: Mass-Transfer Based Analysis” (2014) Chemical Engineering Science, vol.112, p. 143-151, ISSN: 0009-2509, doi: 10.1016/j.ces.2014.03.023.

18. A. Della Torre, G. Montenegro, G.R. Tabor, M.L. Wears, “CFD characterization of flow regimes inside open cell foam substrates”, (2014) International Journal of Heat and Fluid Flow, vol. 50, p.72-82, ISSN: 0142-727X, doi: 10.1016/j.ijheatfluidflow.2014.05.005.

19. Montenegro, G., Onorati, A., Della Torre, A. “The prediction of silencer acoustical performances by 1D, 1D-3D and quasi-3D non-linear approaches” (2013) Computers and Fluids, 71, pp. 208-223

20. Montenegro, G., Della Torre, A., Cerri, T., Lenzi, G., Fioravanti, A., Badalassi, P., Maiani, F. “Fluid Dynamic and Acoustic Optimization Methodology of a Motorbike Intake Airbox Using Multilevel Numerical CFD Models and Experimental Validation Tests” (2013) SAE International Journal of Engines, 6 (3), pp. 1731-1744.

21. Montenegro, G., Della Torre, A., Onorati, A., Fairbrother, R. “A Nonlinear Quasi-3D Approach for the Modeling of Mufflers with Perforated Elements and Sound-Absorbing Material” (2013) Advances in Acoustics and Vibration, Art. No. 546120

22. Stockar, S., Canova, M., Guezennec, Y., Della Torre, A., Montenegro, G., Onorati, A. “Modeling Wave Action Effects in Internal Combustion Engine Air Path Systems: Comparison of Numerical and System Dynamics Approaches” (2013) International Journal of Engine Research, 14 (4), pp. 391-408.

23. G. Montenegro, A. Onorati, A. Della Torre, A. J. Torregrosa “The 3Dcell Approach for The Acoustic Modeling of After-Treatment Devices” (2011) SAE International Journal of Engines, Vol. 2, pp. 2519-2530, ISSN: 1946-3936, doi: 10.4271/2011-24-0215

International Conference papers:

24. A. Della Torre, G. Montenegro, A. Onorati, T. Cerri, “CFD Investigation of the Impact of Electrical Heating on the Light-off of a Diesel Oxidation Catalyst”, (2018) SAE Technical Papers, SAE International, ISSN: 0148-7191, Cobo Center, USA, 2018, doi: 10.4271/2018-01-0961.

25. Montenegro G., Della Torre A., Cerri T., Onorati A., Nocivelli L., Fiocco M., “1D-3D Coupled Simulation of the Fuel Spray Propagation Inside the Air-Box of a Moto3 Motorbike: Analysis of Spray Targeting and Injection Timing.” (2017) In: SAE Technical Papers, p. 1-12, SAE International, ISSN: 0148-7191, Cobo Center, USA, 2017, doi: 10.4271/2017-01-0520.

26. A. Della Torre, G. Montenegro, A. Onorati, T. Cerri, A New Concept of Stirling Machine Based on Rotary Architecture, (2015) Proceedings of the 7th International Exergy, Energy and Environment Symposium.

27. T. Lucchini, A. Della Torre, G. D'Errico, G. Montenegro, M. Fiocco, A. Maghbouli, “Automatic mesh generation for CFD simulations of direct-injection engines”, (2015) SAE Technical Paper 2015-01-0376, 2015, doi:10.4271/2015-01-0376.

28. T. Lucchini, G. D’Errico, G. Montenegro, A. Della Torre, T. Cerri, A. Maghbouli, Comprehensive validation of OpenFOAM based libraries for IC engine simulations with ECN test cases, International Multidimensional Engine Modeling User's Group Meeting 2015

29. Shaabani Lakeh K., Martinelli A., Della Torre A., Montenegro G., Onorati A., “Numerical study of compressor fouling mechanism based on Eulerian-Eulerian approach” (2015) In:

Energy Procedia. ENERGY PROCEDIA, p. 258-264, Elsevier Ltd, ISSN:1876-6102, Rome, ITA, 2015, doi: 10.1016/j.egypro.2015.12.031

30. A. Della Torre, A. Guzzetti, G. Montenegro, T. Cerri, A. Onorati, F. Aloui "CFD modeling of a Beta-type Stirling engine" (2014) WCCM XI-ECCM V-ECFD VI, Barcelona, Spain, 20-25 July. pp. 1096-1113. ISBN: 978-849428447-2.
31. Montenegro, G., Della Torre, A., Onorati, A., Broggi, D. et al., "CFD Simulation of a Sliding Vane Expander Operating Inside a Small Scale ORC for Low Temperature Waste Heat Recovery" (2014) SAE Technical Paper 2014-01-0645, 2014, doi:10.4271/2014-01-0645.
32. Montenegro, G., Della Torre, A., Fiocco, M., Onorati, A., Benatzky, C., Schlager, G. "Evaluating the Performance of a Rotary Vane Expander for Small Scale Organic Rankine Cycles Using CFD Tools" (2014) Energy Procedia, 45, pp. 1136-1145.
33. Stockar, S., Canova, M., Guezennec, Y., Della Torre, A. Montenegro, G., Onorati, A., "Comparison of Numerical and System Dynamics Methods for Modeling Wave Propagation in the Intake Manifold of a Single-Cylinder Engine," SAE Technical Paper 2013-24-0139, 2013, doi:10.4271/2013-24-0139.
34. G. Montenegro, A. Onorati, T. Cerri, A. Della Torre "A Quasi-3D Model for the Simulation of the Unsteady Flows in I.C. Engine Pipe Systems"(2012) In: SAE 2012 World Congress & Exhibition. Detroit (Mi), pp. 1-17, SAE International, ISBN: 9780768076103, DOI: 10.4271/2012-01-0675
35. G. Montenegro, T. Cerri, A. Della Torre, A. Onorati "Modeling the Unsteady Flows in I.C. Engine Pipe Systems by Means of a Quasi-3D Approach" (2012) Proceedings of the ASME Internal Combustion Engine Division Spring Technical Conference (ICES2012). Turin , 6/5/2012-9/5/2012, pp. 1-13, ISBN: 9780791844663
36. G. Montenegro, A. Della Torre, A. Onorati, R. Fairbrother, A. Dolinar "Development and Application of 3D Generic Cells to the Acoustic Modelling of Exhaust Systems" (2011) SAE 2011 Noise and Vibration Conference and Exhibition. SAE Technical Paper, pp. 1-11, ISSN: 0148-7191, Grand Rapids, Michigan, doi: 10.4271/2011-01-1526
37. Montenegro, G., Della Torre, A., Onorati, A., Fairbrother, R., Elnemr, Y., Dolinar, A. "Quasi-3D Acoustic Modelling of Common Intake and Exhaust Components" (2012) 19th International Congress on Sound and Vibration 2012, ICSV 2012, 3, pp. 2430-2437.

National conference papers:

38. A. Della Torre, G. Montenegro, A. Onorati, G. Tabor, "CFD characterization of pressure drop and heat transfer inside porous substrates" (2014) 69° Congresso Annuale ATI, Milano, 10-12 September 2014.
39. A. Della Torre, G. Montenegro, A. Onorati, "The 3DCell Approach for Fluid Dynamic and Acoustic Modeling of I.C. Engine Pipe Systems" (2010) 65° Congresso Nazionale ATI, Domus de Maria (CA), 13-17 September.

International conferences/workshop without article

40. A. Della Torre, G. Montenegro, F. Brusiani, G. M. Bianchi "Characterization of flow regimes and heat/mass transfer inside Kelvin cell type foams by means of OpenFOAM" (2014) WCCM XI-ECCM V-ECFD VI, Barcelona, Spain, 20-25 July.
41. G. Montenegro, A. Della Torre, M. Fiocco, A. Onorati, C. Benatzky, G. Schlager "Evaluating the Performance of a Rotary Vane Expander for Small Scale Organic Rankine Cycles using OpenFOAM®", Open Source Code International Conference 2013, Hamburg, 24-25 October 2013
42. Gianluca Montenegro, Augusto Della Torre, Angelo Onorati "CFD simulation of a Sliding Vane Expander for Low Temperature ORC with Real Gas Effect", 9th OpenFOAM workshop, Zagreb, 23-25 June 2014
43. A. Della Torre, G. Montenegro, G. Tabor, "Simulation of Flow and Heat Transfer in Open-Cell Foams: Micro-scale and Macro-scale Modeling" 7th OpenFOAM workshop, Darmstatd, 23-28 June 2012

PATENTS:

He has obtained an Italian national patent for an innovative Stirling machine based on rotary architecture (Patent number: 0001427088, 15th February 2017. Title: “Macchina a ciclo Stirling”)

AWARDS:

- 2017: “Award for Excellence in Oral Presentation” at the SAE World Conference and Exhibition for the presentation of the work: “A 1D/Quasi-3D Coupled Model for the Simulation of I.C. Engines: Development and Application of an Automatic Cell-Network Generator”.

- 2015: “Second best paper” at the 7th International Exergy, Energy and Environment Symposium (Valenciennes) for the paper: “Slug catcher multiphase CFD modeling: Optimization and comparison with industrial standards”.

- 2010: Gold medal award as best Msc Graduate in Mechanical Engineering (AA 2008-09) at Politecnico di Milano.

Milano, 02/12/2019 Augusto Della Torre