

## **CURRICULUM VITAE OF : GIANPIETRO ELVIO COSSALI**

### **Education:**

1982: "Laurea cum laude" in Nuclear Engineering at Politecnico di Milano

1987: PhD in Energy Sciences from Politecnico di Milano with a thesis on fluid-mechanics of sprays.

### **Profesional experience**

1987-1989: Research Assistant at Mechanical Engineering Department (Fluid Section) of Imperial College of Science & Technology (London).

1990-1992: Research Fellow at the Energy Department of Politecnico di Milano.

1992-1993: Associate Professor of Thermal Physics at Politecnico di Milano, Engineering Faculty.

1993-2001: Associate Professor of Thermal Physics at Università di Bergamo, Engineering Faculty.

2001 onwards: Full Professor of Thermal Physics at Università di Bergamo, Engineering Faculty.

### **Accademic management**

Head of the PhD School of the University of Bergamo

From 2019 to 2021 Chairman of the Research Ethic Committee of University of Bergamo.

From 2019 to 2021 Member of the Board of Directors of University of Bergamo.

From 2016 to 2018 Member of the Academic Senate of University of Bergamo.

From 2009 to 2015 Pro-Rector for Scientific research at Università di Bergamo

### **Research Interests**

Thermofluids; Heat and mass transfer in drops and sprays; Fluid mechanics of engine sprays; Interface dynamics.

### **Teaching Activity**

- Thermal physics (undergraduate- 2<sup>nd</sup> year)

- Thermofluids (graduate-1<sup>st</sup> year)

- Heat transfer (graduate-1<sup>st</sup> year)

### **Some relevant pubblications 2009-2022**

#### Books

- G.E. Cossali, S. Tonini; Drop Heating and Evaporation: Analytical solutions in curvilinear coordinates, Springer Nature Switzerland, 2021, Series Mathematical Engineering, ISBN 978-3-030-49273-1 <https://doi.org/10.1007/978-3-030-49274-8>.

- G. Lamanna, S.Tonini, G.E. Cossali, B. Weigand, (Eds.), Droplet interaction and spray processes, Springer International Publishing, Fluid. Mech. Appl. Vol 121, pp. 311 (2020), ISBN 978-3-030-33337-9

#### Papers

- G.E. Cossali , "Analytical solution of Graetz problem in pipe flow with periodic inlet temperature" *Int. Journal of Heat and Mass Transfer*. 52 (13-14) (2009) 3396-3401. DOI: 10.1016/j.ijheatmasstransfer.2009.02.028.
- S. Tonini, M. Gavaises, A. Theodorakakos and G.E. Cossali, "Numerical investigation of multiple injection strategy on the development of high-pressure Diesel sprays", *Proc. IMechE Vol. 224 Part D: J. Automobile Engineering*, (2009), 125-141. DOI: 10.1243/09544070JAUTO1083
- A Bisighini, G. E. Cossali, C. Tropea, I. V. Roisman, "Crater evolution after the impact of a drop onto a semi-infinite liquid target" *Physical Review E*, 82, 036319, 2010. DOI: 10.1103/PhysRevE.82.036319
- N. Nikolopoulos, G. Strotos, K.S. Nikas, M. Gavaises, A. Theodorakakos, M. Marengo, G.E. Cossali, "Experimental Investigation of a Single Droplet Impact onto a Sessile Drop", *Atomization and Sprays*, 20 (10), 909-922, 2010.
- N. Nikolopoulos<sup>1</sup>, G. Strotos, K.-S. Nikas, A. Theodorakakos, M. Gavaises, M. Marengo, G.E. Cossali, "Single droplet impacts onto deposited drops. Numerical analysis and comparison" *Atomization and Sprays* 20 (11), 935-953, 2010
- A. Bisighini, G.E. Cossali, "High-speed visualization of interface phenomena: single and double drop impacts onto a deep liquid layer." *Journal of Visualization* Volume 14, Number 2, 103-110 (2011), DOI: 10.1007/s12650-011-0072-3
- A. Coghe , G.E. Cossali, "Quantitative optical techniques for dense sprays investigation: a survey" *Optics and Lasers in Engineering* 50 (2012) 46-56 (10.1016/j.optlaseng.2011.07.017)
- S. Tonini and G.E. Cossali, "An analytical model of liquid drop evaporation in gaseous environment", *International Journal of Thermal Science* 57, 2012, 45-53 (10.1016/j.ijthermalsci.2012.01.017).
- S. Tonini and G.E. Cossali , "A novel analytical solution of the non-uniform convective boundary conditions problem for heat conduction in cylinders." *Int. Comm. Heat and Mass Transfer* 39 (2012) 1059-1065
- S. Tonini and G.E. Cossali , "An exact solution of the mass transport equations for spheroidal evaporating drops" , *Intern. Journ. Heat and Mass Transf.*, 60 (2013), 236-240.
- M.Santini, S. Fest-Santini, G.E. Cossali , "LDV characterization and visualization of the liquid velocity field underneath an impacting drop in isothermal conditions", *Experiments in Fluids* (2013) 54:1593
- S. Tonini and G.E. Cossali , " A novel vaporisation model for a single-component drop in high temperature air streams" , *International Journal of Thermal Sciences* 75 (2014) 194-203
- S. Tonini and G.E. Cossali , "An evaporation model for oscillating spheroidal drops" *International Communications in Heat and Mass Transfer* 51, (2014) 18-24.
- S. Tonini, G.E. Cossali, "A novel formulation of multi-component drop evaporation models for spray applications" *International Journal of Thermal Sciences*, 89 (2015) 245-253.
- S. Tonini, G.E. Cossali , "A multi-component drop evaporation model based on analytical solution of Stefan-Maxwell equations" *Intern. Journ. Heat and Mass Transf.*, 92 (2016), 184-189.
- S. Tonini, G.E. Cossali, "One-dimensional analytical approach to modelling evaporation and heating of deformed drops" *Int. J. Heat and Mass Transf.*-Vol. 97 (2016) 301-307
- S. Tonini, G.E. Cossali, "On molar- and mass-based approaches to single component drop evaporation modelling" *Int. Comm. Heat and Mass Transfer*, Vol. 77 (2016) 87-93
- C. Galbiati , S. Tonini , P. Conti , G.E. Cossali, " Numerical simulations of internal nozzle flow in a pressure swirl atomizer for aircraft engines" *Int. J. of Propulsion and Power*, (2016) Vol. 32, No. 6 : pp. 1433-1441
- M. Santini, S. Fest-Santini, G.E. Cossali, , "Experimental study of vortices and cavities from single and double drop impacts onto deep pools" *European Journal of Mechanics B/Fluids* (2017) Vol. 62: pp. 21-31 PII: S0997-7546(16)30297-7 DOI: <http://dx.doi.org/10.1016/j.euromechflu.2016.11.009>
- V.S. Zubkov, G.E. Cossali, S. Tonini, O. Rybdylova, C. Crua, M. Heikal, S.S. Sazhin, Mathematical modelling of heating and evaporation of a spheroidal droplet, *International Journal of Heat and Mass Transfer* 108 (2017) 2181-2190
- G.E. Cossali and S. Tonini, "Modelling the effect of variable density and diffusion coefficient on the heat and mass transfer from a single component spherical drop evaporating in high temperature air streams", *International Journal of Heat and Mass Transfer* 118 (2018) 628-636
- S. Tonini and G.E. Cossali, "Modelling of heat and mass transfer from spheroidal drops with non-uniform surface temperature" *International Journal of Heat and Mass Transfer* 121 (2018) 747-758.
- Tonini, S. and Cossali, G.E. "Modelling of liquid drop heating and evaporation: the effect of drop

- shrinking", *Computational Thermal Sciences*, 10(3) (2018) 273-283.
- G. E. Cossali, S. Tonini, "Variable gas density effects on transport from interacting evaporating spherical drops" *International Journal of Heat and Mass Transfer* 127 (2018) 485-496
  - S. Tonini, G. E. Cossali, "An analytical approach to model heating and evaporation of multicomponent ellipsoidal drops", *Heat Mass Transfer* (2019) 55 1257-1269; DOI 10.1007/s00231-018-2511-3
  - G.E. Cossali, S. Tonini, "An analytical model of heat and mass transfer from liquid drops with temperature dependence of gas thermo-physical properties", *International Journal of Heat and Mass Transfer* 138 (2019) 1166-1177.
  - S. Tonini, P. Conti and G. E. Cossali, "Numerical Modelling of Internal Flow in Water Mist Injectors: Effect of Nozzle Geometry and Operating Conditions", *Fire Technology*, (2019) DOI 10.1007/s10694-019-00871-3
  - S. Tonini, G. Varma Raja Kochanattu, G.E. Cossali, The effect of evaporation on the oscillation frequency of an inviscid liquid drop, *International Communications in Heat and Mass Transfer* 116 (2020) 104609.
  - G.E. Cossali, S. Tonini, Analytical modelling of drop heating and evaporation in drop clouds: Effect of temperature dependent gas properties and cloud shape, *International Journal of Heat and Mass Transfer* 162 (2020) 120315
  - S. Fest-Santini, J. Steigerwald, M. Santini, G.E. Cossali, B. Weigand, Multiple drops impact onto a liquid film: Direct numerical simulation and experimental validation, *Computers and Fluids* 214 (2021) 104761.
  - S. Tonini, G.E. Cossali "Effect of moving boundaries on the modeling of heat and mass transfer from an evaporating spherical drop" *Phys. Fluids* 33, 077117 (2021) <https://doi.org/10.1063/5.0059460>
  - S.Tonini, G.E. Cossali, An analytical model for the evaporation of multi-component spheroidal drops based on Stefan-Maxwell equations, *International Journal of Thermal Sciences* 171 (2022) 107223
  - S. Tonini, P.Conti, G.E. Cossali, "Numerical analysis of regime stability of a water mist pressure swirl atomizer" *Atomization and Sprays*, 31(10):63-92 (2021). <https://doi.org/10.1615/AtomizSpr.2021038314>