

CLAUDIO SOMASCHINI

curriculum vitae

Politecnico di Milano

EDUCATION

11/10/2016

Ph.D in Mechanical Engineering

Department of Mechanical Engineering, Politecnico di Milano

Italian High Speed Rail Development: an Investigation on Train-Infrastructure Aerodynamic Interactions

Supervisor: Prof. Daniele Rocchi

Opponent: Prof. Chris Baker (University of Birmingham), Ing. Stefano Lisi (RFI)

Grade: Laude

20/12/2012

M.Sc. in Mechanical Engineering

Politecnico di Milano

Indagine numerico-sperimentale dell'instabilità dinamica da flutter di un ponte sospeso a grande luce

Supervisor: Prof. Giorgio Diana

Co-Supervisor: Prof. Daniele Rocchi

Grade: 110 cum laude / 110

23/07/2010

B.Sc. in Mechanical Engineering

Politecnico di Milano

Grade: 109/110

WORK EXPERIENCE

June 2019 – present

Assistant Professor

Department of Mechanical Engineering, Politecnico di Milano

Scientific Area: Applied Mechanics (ING-IND/13)

Main topics: Dynamics of railway track, Infrastructure monitoring and diagnostics, Aerodynamics of trains, Wind tunnel testing

January 2019

Visiting Researcher

Railway Technical Research Institute, Tokyo

Structural Mechanics Laboratory, Railway Dynamics Division

Topic: Dynamics of railway infrastructures

January 2016 – May 2019

Research Fellow

Department of Mechanical Engineering, Politecnico di Milano

Scientific Area: Applied Mechanics (ING-IND/13)

Main topics: Dynamics of railway track, Infrastructure monitoring and diagnostics, Aerodynamics of trains, Wind tunnel testing

TEACHING EXPERIENCE

Adjunct Professor

2017/2018 – 2019/2020 – 2021/2022

Mobility: Infrastructures and Services - Applications

5 ECTS, in English

M.Sc. in Mechanical, Electrical and Management Engineering, Politecnico di Milano

Assistant Lecturer

2019/2020 – 2020/2021 – 2021/2022

Control and Actuating Devices for Mechanical Systems

9 ECTS, in English (Prof. G. Bucca - Prof. E. Sabbioni)

M.Sc. in Mechanical Engineering, Politecnico di Milano

2017/2018 – 2018/2019

Dynamics of Aerospace Systems

8 ECTS, in Italian (Dinamica di sistemi aerospaziali – Prof. M. Belloli)

B.Sc. in Aerospace Engineering, Politecnico di Milano

2013/2014 – 2014/2015 – 2015/2016 – 2016/2017 – 2017/2018

Automation and Control Laboratory

5 ECTS, in English (Prof. A. Facchinetti – Prof. D. Tarsitano)

M.Sc. in Automation and Control Engineering, Politecnico di Milano

2016/2017

Fundamentals of Mechanics

8 ECTS, in Italian (Fondamenti di Meccanica Teorica e Applicata – Prof. G. Tomasini)

B.Sc. in Energy Engineering, Politecnico di Milano

2016/2017

Applied Mechanics and Technical Drawing

8 ECTS, in Italian (Meccanica applicata e disegno – Prof. S. Chatterton)

B.Sc. in Electrical Engineering, Politecnico di Milano

2013/2014 – 2014/2015 – 2015/2016

Dynamics and Control of Machines

5 ECTS, in Italian (Dinamica e controllo delle macchine – Prof. G. Tomasini)

B.Sc. in Mechanical Engineering, Politecnico di Milano

RESEARCH ACTIVITIES

Aeroelasticity of long-span bridges

Dynamics of long-span bridges: modal analyses of suspended and cable-stayed bridges at completion and in construction stage, using finite element models. Design of dynamic scale models for wind tunnel testing.

Aeroelastic stability: experimental analysis of the aeroelastic stability of long-span bridges using aeroelastic models in wind tunnel. Numerical analysis by means of nonlinear iterative multi-modal eigenvalue problems.

Projects

Suspension bridge of the Bay of Izmit (main span 1550m); mixed cablestayed/suspension third Bosphorus bridge (railway bridge - main span 1408m); suspension bridge over the Dardanelles strait (main span 2023m); suspension bridge over the Danube in Braila (main span 1120m).

Train aerodynamics

Wind tunnel tests: experimental investigation of the aerodynamic coefficients of HS trains, measurement of the aerodynamic characteristics of pantographs, experimental investigation of the flying ballast issue. On-board and trackside tests: experimental investigation of the main aerodynamic issues such as overpressure in tunnel, pressure comfort, head pressure pulse, aerodynamic loads on workers and passengers, running resistance and ballast lifting.

Numerical analysis: CFD simulations, simulation of the pressure evolution inside a tunnel due to the passages of HS trains through 1D codes.

Projects

ETR500Y1, ETR1000, Vivalto, E403.

Sport aerodynamics

Wind tunnel tests investigating the aerodynamics in different sports: cycling, skiing and ski jumping.

Railway dynamics

On-board and trackside tests: experimental investigation of the dynamic response of several structure (bridges, viaducts, lateral barriers, switches) due to passages of HS trains.

Numerical analysis: FEM-multibody simulations to analyse the dynamic response of different elements (bridges, viaducts, switches) due to the passages of trains.

Bridge monitoring

Design and implementation of monitoring systems for road and rail bridges. Development of numerical models, virtual twins of the real infrastructures, to highlight anomalous behaviours and define indicators of the state of health and the respective intervention thresholds.

SCIENTIFIC PUBLICATIONS

Journal articles

1. Construction stages of the long span suspension Izmit Bay Bridge: Wind tunnel test assessment
G. Diana, Y. Yamasaki, A. Larsen, D. Rocchi, S. Giappino, T. Argentini, A. Pagani, M. Villani, C. Somaschini, M. Portentoso
Journal of Wind Engineering and Industrial Aerodynamics 2013, 123. doi: 10.1016/j.jweia.2013.09.006
2. Ballast flight under high-speed trains: wind tunnel full-scale experimental tests
A. Premoli, D. Rocchi, P. Schito, C. Somaschini, G. Tomasini
Journal of Wind Engineering and Industrial Aerodynamics 2015, 145. doi: 10.1016/j.jweia.2015.03.015
3. A case-study of double multi-modal bridge flutter: experimental result and numerical analysis
T. Argentini, G. Diana, D. Rocchi, C. Somaschini
Journal of Wind Engineering and Industrial Aerodynamics 2016, 151. doi: 10.1016/j.jweia.2016.01.004
4. Wind effects induced by high speed train pass-by in open air
D. Rocchi, G. Tomasini, P. Schito, C. Somaschini
Journal of Wind Engineering and Industrial Aerodynamics 2018, 173. doi: 10.1016/j.jweia.2017.10.020
5. A new methodology for the assessment of the running resistance of trains without knowing the characteristics of the track: Application to full-scale experimental data
C. Somaschini, T. Argentini, D. Rocchi, P. Schito and G. Tomasini
Journal of Rail and Rapid Transit 2018, 232. doi: 10.1177/0954409717751754
6. A new methodology for assessing the actual number of impacts due to the ballast-lifting phenomenon
C. Somaschini, D. Rocchi, P. Schito and G. Tomasini
Journal of Rail and Rapid Transit 2019. doi:10.1177/0954409719866987.
7. Influence of local deck vibrations on the evaluation of the maximum acceleration of a steel-concrete composite bridge for a high-speed railway
K. Matsuoka, A. Collina, C. Somaschini and M. Sogabe
Engineering Structures 2019, 200. doi: 10.1016/j.engstruct.2019.109736.
8. Numerical-experimental analysis of the slipstream produced by a high speed train
A. Zampieri, D. Rocchi, P. Schito and C. Somaschini
Journal of Wind Engineering and Industrial Aerodynamics 2020, 196. doi: 10.1016/j.jweia.2019.104022.
9. Effect of the low-frequency turbulence on the aeroelastic response of a long-span bridge in wind tunnel
T. Argentini, D. Rocchi and C. Somaschini
Journal of Wind Engineering and Industrial Aerodynamics 2020, 197. doi: 10.1016/j.jweia.2019.104072.
10. Full-Scale Experimental Investigation of the Interaction between Trains and Tunnels
C. Somaschini, T. Argentini, E. Brambilla, D. Rocchi, P. Schito and G. Tomasini
Applied Sciences 2020, 10. doi:10.3390/app10207189
11. Drive-by methodology to identify resonant bridges using track irregularity measured by high-speed trains
K. Matsuoka, H. Tanaka, K. Kawasaki, C. Somaschini, A. Collina
Mechanical Systems and Signal Processing 2021, 158. doi: 10.1016/j.ymssp.2021.107667
12. Full-scale derailment tests on freight wagons
G. Diana, E. Sabbioni, C. Somaschini, D. Tarsitano, P. Cavicchi, M. Di Mario and L. Labbadia
Vehicle System Dynamics 2021. doi: 10.1080/00423114.2021.1877745

13. 15-Min Station: A Case Study in North Italy City to Evaluate the Livability of an Area
F. Borghetti, C. G. Colombo, M. Longo, R. Mazzoncini, L. Cesarini, L. Contestabile and C. Somaschini
Sustainability 2021. doi: 10.3390/su131810246
14. Relationship between railway stations and the territory: case study in Lombardy - Italy for 15-min station
F. Borghetti, M. Longo, R. Mazzoncini, C. Somaschini, L. Cesarini and L. Contestabile
International journal of transport development and integration 2021. doi: 10.2495/TDI-V5-N4-367-378
15. Virtual homologation of high-speed trains in railway tunnels: A new iterative numerical approach for train-tunnel pressure signature
E. Brambilla, P. Schito, C. Somaschini, and D. Rocchi
Journal of Rail and Rapid Transit 2021. doi: 10.1177/09544097211029164
16. Aeroelastic stability of a twin-box deck: Comparison of different procedures to assess the effect of geometric details
T. Argentini, D. Rocchi, C. Somaschini, U. Spinelli, F. Zanelli and A. Larsen
Journal of Wind Engineering and Industrial Aerodynamics 2022, 220. doi: 10.1016/j.jweia.2021.104878

Conference papers

1. Comparisons between wind tunnel tests on a full aeroelastic model of a suspended bridge and numerical results
T. Argentini, G. Diana, A. Larsen, A. Pagani, M. Portentoso, C. Somaschini, Y. Yamasaki
EACWE 2013, Nottingham, UK, July 7-11, 2013, Author
2. Ballast flight under high-speed trains: full-scale experimental tests
C. Somaschini, M. Livraghi, A. Premoli, D. Rocchi, P. Schito, G. Tomasini
Aerovehicles1, Bordeaux, France, June 23-25, 2014, Lecturer
3. An experimental investigation on flying ballast phenomenon: on board measurements with microphones and optical barriers
C. Somaschini, M. Merli, A. Premoli, D. Rocchi, P. Schito, G. Tomasini
Aerovehicles1, Bordeaux, France, June 23-25, 2014, Lecturer
4. Experimental investigation of low-frequency turbulence effects on the aeroelastic response of model-scale long span bridge
T. Argentini, G. Diana, D. Rocchi, C. Somaschini
ICWE14, Porto Alegre, Brazil, June 21-26, 2015, Author
5. Numerical and Experimental Analysis of the Pressure Signature for different High Speed Trains
C. Somaschini, D. Rocchi, P. Schito, G. Tomasini
CC2015, Prague, Czech Republic, September 1-4, 2015, Lecturer
6. A Computational Fluid Dynamics Study on the Relative Motion Effects for High Speed Train Crosswind Assessment
A. Premoli, D. Rocchi, P. Schito, C. Somaschini, G. Tomasini
CC2015, Prague, Czech Republic, September 1-4, 2015, Lecturer
7. Simplified estimation of the train resistance parameters: full scale experimental tests and analysis
C. Somaschini, D. Rocchi, G. Tomasini, P. Schito
RAILWAYS2016, Cagliari, Italy, April 5-8, 2016, Lecturer
8. Aerodynamic Loads in Open Air of High Speed Trains: Analysis of Experimental Data
M.M. Caccialanza, D. Rocchi, P. Schito, C. Somaschini, G. Tomasini
RAILWAYS2016, Cagliari, Italy, April 5-8, 2016, Lecturer

9. Ballast lifting: a challenge in the increase of the commercial speed of HS-Trains
D. Rocchi, G. Tomasini, P. Schito, C. Somaschini, M. Testa, M. Cerullo, G. Arcoleo
WCRR2016, Milan, Italy, Maj 29-June 2, 2016, Lecturer
10. Measurement of the aerodynamic features of the ETR1000-V300Zefiro high-speed train
D. Rocchi, P. Schito, C. Somaschini, G. Tomasini, T. Argentini, L. Barbone, M., Sima, L. Bocciolini, G. Galeazzo
WCRR2016, Milan, Italy, Maj 29-June 2, 2016, Lecturer
11. Underbody blockage effect on the aerodynamic coefficients of train vehicles
D. Rocchi, G. Tomasini, C. Somaschini, S. Giappino
Aerovehicles2, Göteborg, Sweden, June 21-23, 2016, Lecturer
12. Full-scale experimental study on the new Italian high-speed train aerodynamics: on board and trackside measurements
C. Somaschini, T. Argentini, D. Rocchi, P. Schito, G. Tomasini
Aerovehicles2, Göteborg, Sweden, June 21-23, 2016, Lecturer
13. Drafting effect in cycling: investigation by wind tunnel tests
M. Belloli, S. Giappino, F. Robustelli, C. Somaschini
ISEA2016, Delft, The Netherlands, July 11-14, 2016, Author
14. Wind effects induced by high speed train pass-by
D. Rocchi, G. Tomasini, P. Schito, C. Somaschini
IN-VENTO, Terni, Italy, September 25-28, 2016, Author
15. Experimental analysis of a composite bridge under high-speed train passages
C. Somaschini, K. Matsuoka, A. Collina
EURODYN 2017, Rome, Italy, September 10-13, 2017, Lecturer
16. Comparison between train-tunnel pressure signatures: single unit vs double unit
E. Brambilla, C. Somaschini, P. Schito, G. Tomasini, D. Rocchi
Aerovehicles3, Milan, Italy, June 13-15, 2018, Author
17. Infrastructure scenario effect on train aerodynamic coefficients
D. Rocchi, C. Somaschini, G. Tomasini
Aerovehicles3, Milan, Italy, June 13-15, 2018, Author
18. URANS simulation of the slip stream of a high speed train
A. Zampieri, D. Rocchi, P. Schito, C. Somaschini
Aerovehicles3, Milan, Italy, June 13-15, 2018, Author
19. Virtual homologation of high-speed trains running in tunnels using an iterative numerical algorithm
E. Brambilla, C. Somaschini, D. Rocchi, P. Schito, G. Tomasini
RAILWAYS2018, Sitges, Spain, September 3-7, 2018, Lecturer
20. Influence of the flow within a tunnel on the train-tunnel pressure signature
C. Somaschini, E. Brambilla, D. Rocchi, P. Schito, G. Tomasini
RAILWAYS2018, Sitges, Spain, September 3-7, 2018, Lecturer
21. Cyclist aerodynamics: a comparison between wind tunnel tests and CFD simulations for helmet design
S. Giappino, S. Omarini, P. Schito, C. Somaschini, M. Belloli, M. Tenni
IN-VENTO, Napoli, Italy, September 9-12, 2018, Author
22. Design of experiment approaches for the calibration of instrumented wheel-set
S. Bionda, E. Di Gialleonardo, C. Somaschini, F. Braghin
VSDIA2018, Budapest, Hungary, November 5-7, 2018, Lecturer

23. Algorithm development to classify the deterioration of insulated rail joints by means of onboard measurements
C. Somaschini, E. Di Gialleonardo, A. Collina, M. Bocciolone
VSDIA2018, Budapest, Hungary, November 5-7, 2018, Lecturer
24. Damage detection in railway bridges by means of train on-board sensors: a sensitivity analysis
C. Somaschini, M. Carnevale, K. Matsuoka, A. Collina
WCRR2019, Tokyo, Japan, October 28 - November 1, 2019, Lecturer
25. A numerical investigation of new algorithms for the drive-by method in railway bridge monitoring
L. Bernardini, M. Carnevale, C. Somaschini, K. Matsuoka, A. Collina
EURODYN 2020, Athens, Greece, November, 23-26, 2020, Author
26. Development of a new urban line with innovative trams
F. Borghetti, C. G. Colombo, M. Longo, R. Mazzoncini, C. Somaschini
Urban and Maritime Transport XXVII, Online, June, 16-18, 2021, Author
27. Relationship between railway stations and the territory: case study in Lombardy, Italy, for 15-minute station.
F. Borghetti, M. Longo, R. Mazzoncini, C. Somaschini, L. Cesarini and L. Contestabile
Sustainable City 2021, Online, October 5-7, 2021, Author
28. Transformation of an existing urban bus line: Milan Full Electric project
F. Borghetti, M. Longo, R. Mazzoncini, A. Panarese and C. Somaschini
XXV International Conference Living and Walking in Cities, Brescia, Italy, September 9-10, 2021, Author
29. SHM campaign on Italian high speed railway viaducts by means of OMA and wireless sensors network
L. Bernardini, L. Benedetti, C. Somaschini, G. Cazzulani and M. Belloli
EVACES 2021, Online, September 14-17, 2021, Author
30. Load testing and structural monitoring of a reinforced concrete mid-century bridge
G. Zani, A. Scalbi, K. Flores Ferreira, C. Somaschini and M. di Prisco
EUROSTRUCT 2021, Italy, Padua, August 29 – September 1, 2021, Author

Book chapters

1. The Infrastructure for Sustainable Mobility
R. Mazzoncini, M. Longo and C. Somaschini
Green Planning for Cities and Communities - Novel Incisive Approaches to Sustainability, Springer, 2020.
2. New Behaviours and Digitalisation for Sustainable Mobility, Mobility as a Service (MaaS)
R. Mazzoncini, C. Somaschini and M. Longo
Green Planning for Cities and Communities - Novel Incisive Approaches to Sustainability, Springer, 2020.

Milano, 13-01-2022

Autorizzo al trattamento dati ai sensi del GDPR 2016/679 del 27 aprile 2016 (Regolamento Europeo relativo alla protezione delle persone fisiche per quanto riguarda il trattamento dei dati personali).