

CURRICULUM VITAE

Prof. [Fabrizio Barpi](#)

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1 Present position

Associate professor of Structural Mechanics, Department of Structural, Geotechnical and Building Engineering, Politecnico di Torino

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2 Education

1996 PhD in Structural Engineering at Politecnico di Torino. Title of thesis: *Numerical models for the study of cracking phenomena in dams.*

1992 Graduated in Civil Engineering from Politecnico di Torino. Title of thesis: *Approaches in geometrically non-linear elasticity.*

3 Teaching activities

- Politecnico di Torino:

2015–present	Teacher of Fundamentals of Structural Analysis, Architecture.
2012–2014	Teacher of Theory and Design of Structures, Architecture.
2007–2010	Teacher of Structural Mechanics, Civil Engineers, Faculty of Engineering.
2004–2006	Teacher of Advanced Structural Mechanics, Civil Engineers, Faculty of Engineering.
2002–2004	Teacher of Theory of Elasticity, Aerospace Engineers, Faculty of Engineering.
2001/2002	Teacher of Structural Mechanics, Aerospace Engineers, Faculty of Engineering.
1996–2001	Assistant teacher of Structural Mechanics, Aerospace Engineers, Faculty of Engineering.
1993–1995	Assistant teacher of Structural Mechanics, Faculty of Architecture.

- Turin Polytechnic University in Tashkent (Uzbekistan):

2014–present Teacher of Structural Mechanics, Civil Engineering.

Advisor of more than 60 master's degree thesis and one doctoral thesis.

Designer of a website created to improve learning Structural Mechanics (<http://130.192.29.35:8080/examples/jsp/index.html>).

4 Research

4.1 Non-conservative continuum mechanics and fracture mechanics

This research activity is focused on the study of concrete structures under constant and cyclic loading. The non linear behaviour of concrete-like materials in tension is characterized by the localisation of strain (*strain-softening*). This phenomenon can be analysed accurately through the so-called *cohesive crack model* which uses the length of the fictitious crack as a control variable.

These research topics can be summarized as follows.

- Size-related phenomenon of bifurcation of equilibrium path.
- Interaction of viscous phenomena and crack growth (Mode I and Mixed Mode conditions):
 - Phenomenological models (cylinder tests, three point bending tests, dam models),
 - Models based on *non-integer derivatives* coupled with micromechanical models,
 - Influence of imprecise (*fuzzy*) parameters on the response of the model.
- Impact behaviour of concrete (high strain/stress rates) carried out in cooperation with the *Department of Civil Engineering and Geosciences* of Delft University (The Netherlands).
- Cyclic loading and crack growth.
- Behaviour of dam-foundation joints.
- Scale effects on:
 - maximum load and rupture mechanisms,
 - dam models,
 - failure lifetime (creep),
 - fatigue limit (cyclic loading).

4.2 Dynamics of Snow Avalanches

Since 2002 has been leading a research group working on a project funded by *Istituto Nazionale per la Ricerca sulla Montagna (Italian Institute of Mountain Research): Design guidelines for existing buildings with respect to avalanches hazard*. The group is working on the numerical simulation of the dynamics of powder and dense snow avalanches to assess the influence of such events on existing buildings.

A short summary of this research follows.

- Numerical simulation of the dynamics of powder and dense snow avalanches to assess the influence of such events on existing buildings and to produce design guidelines for structures with respect to avalanches hazard.
- Development and maintenance of an instrumented test site for natural and artificial avalanches (project DYNAVAL, RISKMAT)
- Development of a new device for measuring the shear strength of snow specimens in situ, a key parameter in snow mechanics (project MAP3).

4.3 Seismic Analysis of Dams

This research activity is related to seismic analysis for dam safety, estimation of seismic hazards, analysis of expected performance during earthquakes, two and three dimensional finite element modeling and constitutive modeling of materials.

5 Projects

5.1 Research Project (principal investigator)

- 2018 *Experimental study of snow strength*, funded by Department of Structural, Geotechnical and Building Engineering.
- 2016 *Stability of existing dams under seismic conditions – Sabetta dam*, funded by IREN Energia.
- 2015 *Stability of existing dams under seismic conditions – Ceresole dam*, funded by IREN Energia.
- 2002 *Design guidelines of existing buildings with respect to avalanches hazard* funded by Istituto Nazionale per la Ricerca sulla Montagna (Italian Institute of Mountain Research).

5.2 Projects Funded by the Italian Ministry of Education, University and Scientific Research

Participated in the following projects funded by the Italian Ministry of Education, University and Scientific Research:

- 2008-10 *Structural monitoring, diagnostic inverse analyses and safety assessments of existing concrete dams.*
- 2005/06 *Engineering evaluation of concrete gravity dam safety: an approach based on computational fracture mechanics.*
- 2003/04 *Influence of parameters uncertainties on structural behaviour of concrete dams: long-term cracking, water/fracture interaction size-effects.*
- 2001/02 *Time effect on ultimate limit state of large concrete dams.*
- 1999/00 *Scale effects, in space and time, on the structural response of concrete dams.*

5.3 Other projects

- 2014 *Monitoring system for debris flow barriers located at Grand Valey torrent (Aosta Valley Region, Italy)*, funded by Regione Autonoma Valle d'Aosta (RiskNat: Gestione in sicurezza dei territori di montagna transfrontalieri – Obiettivo di cooperazione territoriale europea Programma Italia-Francia (Alpi) 2007/2013 - ALCOTRA).
- 2014 *Design and construction of a monitored snow umbrella*, funded by Regione Autonoma Valle d'Aosta (RiskNat: Gestione in sicurezza dei territori di montagna transfrontalieri – Obiettivo di cooperazione territoriale europea Programma Italia-Francia (Alpi) 2007/2013 - ALCOTRA).
- 2012-14 *Monitoring for the avalanche prevision, prediction and protection (MAP3)*, funded by Regione Autonoma Valle d'Aosta.
- 2011-12 *Numerical simulation models for subsidence phenomena*, funded by Golder Associates.
- 2008 *Gebbo dam - Deterministic model to control dam behaviour* funded by ENEL-University, program Eureka! – un'idea per l'energia.
- 2007-13 Program "Italy - France (Alps - ALCOTRA)" project *DynAval - Dynamique des avalanches: départ et interactions écoulement/obstacles*, funded by Valle d'Aosta (Obiettivo Cooperazione territoriale europea Italia-Francia (Alpi), 2007-2013).

6 Visiting scientist

- 2018 Snow and Ice Research Center of the *National Research Institute for Earth Science and Disaster Resilience* (Japan).
- 2014 Universidade Federal de Minas Gerais (UFMG), Belo Horizonte (Brasil).
- 1999 Delft University (European Program *Spatio-temporal instabilities in deformation and fracture*).

7 Advisory Commission on Dam Regulation

- 2017 Member of the *Assessment of Dam Safety under Seismic Condition* committee, Consiglio Superiore dei Lavori Pubblici.
- 2014 Appointed by the Italian Minister Graziano Delrio as a member of the Advisory Commission of the Technical Standards for Dams (*Norme tecniche per la progettazione e la costruzione degli sbarramenti di ritenuta (dighe e traverse)*), Consiglio Superiore dei Lavori Pubblici.

8 Awards

2006, 2007 : awarded, among other young researcher of Politecnico di Torino, of a grant of 3000 € to attend international conferences.

9 Peer Review Service

Served as a reviewer for the following international journals: *Journal of Engineering Mechanics (ASCE)*, *The Open Environmental Engineering Journal*, *The Open Civil Engineering Journal*, *Engineering Structures*, *Applied Mathematical Modeling*, *Construction Materials*, *The Cryosphere*, *Computers and Structures*, *Journal of Strain Analysis for Engineering Design*, *Computer-Aided Civil and Infrastructure Engineering*, *International Journal of Solids and Structures*, *Fatigue and Fracture of Engineering Materials and Structures*, *Tunnelling and Underground Space Technology* and *Rock Mechanics and Rock Engineering*.

Awarded by Elsevier as Recognized Reviewer (2017).

10 Affiliation

Is/was member of: ItCOLD (*Italian Committee on Large Dams*) IACM (*International Association of Computational Mechanics*), EUROMECH (*European Mechanics Society*), FraMCoS (*Fracture Mechanics of Concrete Structures*), ESIS (*European Structural Integrity Society*), AIMETA (*Associazione Italiana di Meccanica Teorica e Applicata*), GIMC (*Gruppo Italiano di Meccanica Computazionale*) and IGF (*Gruppo Italiano Frattura*).

11 Conferences Organization

Member of the technical committee of the international conference:

- *Third International Workshop on Performance, Protection & Strengthening of Structures under Extreme Loading* (PROTECT 2011), Lugano (Switzerland), August 30-September 1, 2011.
- *Second International Workshop on Performance, Protection & Strengthening of Structures under Extreme Loading* (PROTECT 2009), Shonan Village Center, Hayama (Japan), August 19-21, 2009.
- *First International Workshop on Performance, Protection & Strengthening of Structures under Extreme Loading* (PROTECT 2007), Whistler (Canada), August 20-22, 2007.
- 11 International Conference on Fracture, Torino, March 20-25, 2005.

- Localized Damage 1998, Bologna, June 8-10, 1998.

12 Publications on international journals with referee

1. V. De Biagi, M. Barbero, F. Barpi, M. Borri-Brunetto, and E.A. Podolskiy. Failure mechanics of snow layers through image analysis. *European Journal of Mechanics / A Solids*, (74):26–33, 2019. doi:10.1016/j.euromechsol.2018.10.018.
2. G. Bella, F. Soares Lameiras, T. Esposito, M. Barbero, and F. Barpi. Aging simulation of the tailings from Stava fluorite extraction by exposure to gamma rays. *REM – Revista Escola de Minas*, (70(4)):483–490, 2017. doi:10.1590/0370-44672016700163.
3. G. Bella, M. Barbero, F. Barpi, M. Borri Brunetto, and D. Peila. An innovative bio-engineering retaining structure for supporting unstable soil. *Journal of Rock Mechanics and Geotechnical Engineering*, 2017. doi:10.1016/j.jrmge.2016.12.002.
4. S. Valente, A. Alberto, and F. Barpi. A large time increment method applied to an interface cohesive crack growing in compression-shear conditions. *Engineering Fracture Mechanics*, (192):362–371, 2018. doi:10.1016/j.engfracmech.2016.04.019.
5. M. Borri-Brunetto, M. Alessio, M. Barbero, F. Barpi, O. Pallara, and V. De Biagi. Stiffening effect of bolt-on transducers on strain measurements. *Latin American Journal of Solids and Structures*, 13(3):536–553, 2016. doi:10.1590/1679-78252109.
6. E.A. Podolskiy, M. Barbero, F. Barpi, G. Chambon, M. Borri-Brunetto, O. Pallara, B. Frigo, B. Chiaia, and M. Naaim. Healing of snow surface-to-surface contacts by isothermal sintering. *The Cryosphere*, (8):1651–1659, 2014. doi:10.5194/tcd-8-2465-2014.
7. M. Barbero, F. Barpi, M. Borri Brunetto, V. De Biagi, G. Olivero, and O. Pallara. Snow pressure on a semiflexible retaining structure. *Journal of Cold Regions Engineering (ASCE)*, 2014. doi:10.1061/(ASCE)CR.1943-5495.0000065.
8. M. Barbero, F. Barpi, M. Borri Brunetto, and O. Pallara. An apparatus for in-situ direct shear tests on snow. *Experimental Techniques*, pages 1–10, 2013. doi:10.1007/s40799-016-0019-7.
9. F. Barpi and M.A.B. Deakin. The Bédidor bascule bridge design. *International Journal for the History of Engineering & Technology*, 82(2):159–175, 2012. doi:10.1179/1758120612Z.0000000010.
10. M. Barbero, F. Barpi, M. Borri Brunetto, E. Bovet, B. Chiaia, V. De Biagi, B. Frigo, O. Pallara, M. Maggioni, M. Freppaz, E. Ceaglio, D. Godone, D. Viglietti, and E. Zanini. A new experimental snow avalanche test site at Seehore peak in Aosta Valley (NW Italian Alps) – Part II: engineering aspects. *Cold Regions Science and Technology*, (86):14–21, 2013. doi:10.1016/j.coldregions.2012.10.014.
11. M. Maggioni, M. Freppaz, E. Ceaglio, D. Godone, D. Viglietti, E. Zanini, M. Barbero, F. Barpi, M. Borri Brunetto, E. Bovet, B. Chiaia, V. De Biagi, B. Frigo, and O. Pallara. A new experimental snow avalanche test site at Seehore peak in Aosta Valley (NW Italian Alps) – Part I: preliminary analysis and logistics. *Cold Regions Science and Technology*, (85):175–182, 2013. doi:10.1016/j.coldregions.2012.09.006.
12. S. Valente, C. Fidelibus, S. Loew, M. Cravero, G. Iabichino, and F. Barpi. Analysis of fracture mechanics tests on opalinus clay. *Rock Mechanics and Rock Engineering*, 45(5):767–779, 2012. doi:10.1007/s00603-012-0225-2.
13. F. Barpi, S. Valente, M. Cravero, G. Iabichino, and C. Fidelibus. Fracture mechanics characterization of an anisotropic geomaterial. *Engineering Fracture Mechanics*, (84):111–122, 2012. doi:10.1016/j.engfracmech.2012.01.010.

14. F. Barpi, M. Barbero, and D. Peila. Numerical modelling of ground-tunnel support interaction using bedded-beam-spring model with fuzzy parameters. *Gospodarka Surowcami Mineralnymi (Mineral Resources Management)*, 4(27):71–87, 2011.
15. M. Barbero and F. Barpi. Quarry-induced slope instability at a broadcasting transmission plant near Valcava, Lombardia, Italy. *International Journal of Geoengineering Case Histories*, 2(2):163–181, 2011. doi:10.4417/IJGCH-02-02-04.
16. F. Barpi and D. Peila. Influence of the tunnel shape on shotcrete linings stresses after excavation. *Computer-Aided Civil and Infrastructure Engineering*, (27):260–275, 2012. doi:10.1111/j.1467-8667.2011.00728.x.
17. F. Barpi and S. Valente. Failure lifetime of concrete structures under creep and fracture. *Magazine of Concrete Research*, 63(5):371–376, 2011. Thomas Telford (Great Britain). doi:10.1680/macrr.9.00159.
18. F. Barpi and S. Valente. The cohesive frictional crack model applied to the analysis of the dam-foundation joint. *Engineering Fracture Mechanics*, 77:2182–2191, 2010. Elsevier Science Ltd. (Great Britain). doi:10.1016/j.engfracmech.2010.02.030.
19. F. Barpi and S. Valente. Subcritical crack propagation under cyclic load of concrete structures. *Magazine of Concrete Research*, 62(7):489–496, 2010. Thomas Telford (Great Britain). doi:10.1680/macrr.2010.62.7.489.
20. F. Barpi, M. Borri-Brunetto, and L. Delli Veneri. Cellular-automata model for dense-snow avalanches. *Journal of Cold Regions Engineering (ASCE)*, 21(4):121–140, 2007. ASCE Publications (USA). doi:10.1061/(ASCE)0887-381X(2007)21:4(121).
21. F. Barpi and S. Valente. Modeling water penetration at dam-foundation joint. *Engineering Fracture Mechanics*, 75/3-4:629–642, 2008. Elsevier Science Ltd. (Great Britain). doi:10.1016/j.engfracmech.2007.02.008.
22. F. Barpi and S. Valente. Lifetime evaluation of concrete structures under sustained post-peak loading. *Engineering Fracture Mechanics*, 72:2427–2443, 2005. Elsevier Science Ltd. (Great Britain). doi:10.1016/j.engfracmech.2005.03.010.
23. F. Barpi. Fuzzy modelling of powder snow avalanches. *Cold Regions Science and Technology*, 40(3):213–227, 2004. Elsevier Science Ltd. (Great Britain). doi:10.1016/j.coldregions.2004.08.003.
24. F. Barpi and S. Valente. A fractional order rate approach for modeling concrete structures subjected to creep and fracture. *International Journal of Solids and Structures*, 41/9-10:2607–2621, 2004. Elsevier Science Ltd. (Great Britain). doi:10.1016/j.ijsolstr.2003.12.025.
25. F. Barpi. Impact behaviour of concrete: a computational approach. *Engineering Fracture Mechanics*, 71/15:2197–2213, 2004. Elsevier Science Ltd. (Great Britain). doi:10.1016/j.engfracmech.2003.11.007.
26. F. Barpi and S. Valente. Creep and fracture in concrete: A fractional order rate approach. *Engineering Fracture Mechanics*, 70(5):611–623, 2003. Elsevier Science Ltd. (Great Britain). doi:10.1016/S0013-7944(02)00041-3.
27. A. Carpinteri, P. Cornetti, F. Barpi, and S. Valente. Cohesive crack model description of ductile to brittle size-scale transition: Dimensional analysis vs. renormalization group theory. *Engineering Fracture Mechanics*, 70(14):1809–1839, 2003. Elsevier Science Ltd. (Great Britain). doi:10.1016/S0013-7944(03)00126-7.

28. F. Barpi and S. Valente. Fuzzy parameters analysis of time–dependent fracture of concrete dam models. *International Journal for Numerical and Analytical Methods in Geomechanics*, 26:1005–1027, 2002. John Wiley and Sons Ltd. (Great Britain). doi:[10.1002/nag.235](https://doi.org/10.1002/nag.235).
29. F. Barpi and S. Valente. Numerical simulation of prenotched gravity dam models. *Journal of Engineering Mechanics (ASCE)*, 126(6):611–619, 2000. ASCE Publications (USA). doi:[10.1061/\(ASCE\)0733-9399\(2000\)126:6\(611\)](https://doi.org/10.1061/(ASCE)0733-9399(2000)126:6(611)).
30. F. Barpi, G. Ferrara, L. Imperato, and S. Valente. Lifetime of concrete dam models under constant loads. *Materials and Structures*, 32:103–111, 1999. RILEM Publications (France).
31. F. Barpi and S. Valente. Size-effects induced bifurcation phenomena during multiple cohesive crack propagation. *International Journal of Solids and Structures*, 35(16):1851–1861, 1998. Elsevier Science Ltd. (Great Britain). doi:[10.1016/S0020-7683\(97\)00158-3](https://doi.org/10.1016/S0020-7683(97)00158-3).