

Paolo Espa PhD - Curriculum Vitae

Position Assistant Professor of Hydraulics
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Education and academic experience

- Assistant professor of Hydraulics at Insubria University (2005-present)
- Research fellow at the University of Pavia - Dept. of Hydraulic and Environmental Engineering (2003-2004)
- Post-doc fellow at the University of Pavia - Dept. of Hydraulic and Environmental Engineering (2000-2002)
- PhD in Civil Engineering at the University of Pavia - Dept. of Hydraulic and Environmental Engineering (2000)
- M.Sc. with honors in Hydraulic Engineering at Rome University “La Sapienza” (1994)

Research topics

- Sustainable sediment management in hydropower developed Alpine catchments from a multi-disciplinary perspective: experimental and numerical investigation of sediment transport during sediment flushing from reservoirs, accounting for the impact on the river biota of the flushing events
- Sustainable management of water diversion at hydropower/agriculture intakes in Alpine streams and lowland rivers from a multi-disciplinary perspective: experimental and numerical investigation of river habitats under low flow conditions
- Local scouring due to a plane wall jet on non-cohesive sand bed: experimental investigation in the lab by ADV and image processing
- Flow induced by vertical 2-D liquid jets introduced from the bottom of rectangular free-surface tanks: numerical (by FV, VM, and SPH techniques) and experimental investigation in the lab (by LDA and image processing)
- Buoyancy driven flows over complex topographies, with focus on circulations induced by differential heating of a valley sidewalls: numerical investigation by FV method and experimental analysis in the lab of the flow in a trapezoidal cavity with sides held at different temperature
- Turbulent horse-shoe vortex in free-surface flow, with rigid and mobile bed: experimental investigation in the lab by LDA, LIF, and scour measurements

International projects

- INTERREG Italy/Switzerland project ECOIDRO: Water Use and Safeguard of Environment and Biodiversity in the River Basins of Adda, Mera, Poschiavino and Inn - ID 7630754 (scientific coordinator of two main tasks in 2009-2012)
- Integrated project of sustainable development in the Rio Pojuca catchment - Bahia (Brazil), promoted by Lombardy Region (Operational Unit of International

- Relations), Government of the State of Bahia (Secretaria de Meio Ambiente e Recursos Hidricos - SEMARH), and Dept. Environment-Health-Safety of the Insubria University (co-author of the final report in 2006-2008)
- Integrated project of sustainable development in the area of Sobradinho reservoir - Bahia (Brazil) - promoted by Lombardy Region (Operational Unit of International Relations), Government of the State of Bahia (Secretaria de Meio Ambiente e Recursos Hidricos - SEMARH), and Insubria University (co-author of the Water Master-Plan report in 2004-2006)

Scientific papers

International journals

- Quadroni S, Crosa G, Gentili G, Espa P (2017). Response of stream benthic macroinvertebrates to current water management in Alpine catchments massively developed for hydropower. *SCIENCE OF THE TOTAL ENVIRONMENT*, vol. 609, p. 484-496, ISSN: 0048-9697, doi: 10.1016/j.scitotenv.2017.07.099
- Brignoli ML, Espa P, Batalla RJ (2017). Sediment transport below a small alpine reservoir desilted by controlled flushing: field assessment and one-dimensional numerical simulation. *JOURNAL OF SOILS AND SEDIMENTS*, vol. 17, p. 2187-2201, ISSN: 1439-0108 (Print) 1614-7480 (Online), doi: 10.1007/s11368-017-1661-0
- Espa P, Brignoli ML, Crosa G, Gentili G, Quadroni S (2016). Controlled sediment flushing at the Cancano Reservoir (Italian Alps): Management of the operation and downstream environmental impact. *JOURNAL OF ENVIRONMENTAL MANAGEMENT*, vol. 182, p. 1-12, ISSN: 0301-4797, doi: 10.1016/j.jenvman.2016.07.021
- Quadroni S, Brignoli ML, Crosa G, Gentili G, Salmaso F, Zaccara S, Espa P (2016). Effects of sediment flushing from a small Alpine reservoir on downstream aquatic fauna. *ECOHYDROLOGY*, ISSN: 1936-0592, DOI: 10.1002/eco.1725
- Espa P, Crosa G, Gentili G, Quadroni S, Petts G (2015). Downstream ecological impacts of controlled sediment flushing in an alpine valley river: a case study. *RIVER RESEARCH AND APPLICATIONS*, vol. 31, p. 931-942, ISSN: 1535-1459, doi: 10.1002/rra.2788
- Brignoli LM, Espa P, Quadroni S, Torretta V, Ionescu G (2015). Environmental impact of reservoir desilting operation. *SCIENTIFIC BULLETIN - "POLITEHNICA" UNIVERSITY OF BUCHAREST. SERIES D, MECHANICAL ENGINEERING*, vol. 77, p. 257-270, ISSN: 1454-2358
- Espa P, Sibilla S (2014). Experimental study of the scour regimes downstream of an apron for intermediate tailwater depth conditions. *JOURNAL OF APPLIED FLUID MECHANICS*, vol. 7(4), p. 611-624, ISSN: 1735-3645
- Espa P, Castelli E, Crosa G, Gentili G (2013). Environmental effects of storage preservation practices: controlled flushing of fine sediment from a small hydropower reservoir. *ENVIRONMENTAL MANAGEMENT*, vol. 52, p. 261-276, ISSN: 0364-152X, doi: 10.1007/s00267-013-0090-0
- Crosa G, Castelli E, Gentili G, Espa P (2010). Effects of suspended sediments from reservoir flushing on fish and macroinvertebrates in an alpine stream. *AQUATIC SCIENCES*, vol. 72(1), p. 85-95, ISSN: 1015-1621, doi: 10.1007/s00027-009-0117-Z
- Espa P, Sibilla S, Gallati M (2008). SPH simulations of a vertical 2-D liquid jet introduced from the bottom of a free-surface rectangular tank. *ADVANCES AND APPLICATIONS IN FLUID MECHANICS*, vol. 3, p. 105-140, ISSN: 0973-4686

Books chapters

- Quadroni S, Crosa G, Zaccara S, Espa P, Brignoli ML, Gentili G, Batalla RJ (2016). Controlling sediment flushing to mitigate downstream environmental impacts. In: River Sedimentation. Wieprecht S, Haun S, Weber K, Noack M & Terheiden K eds. p. 1074-1080, Leiden (The Netherlands): CRC Press / Balkema, Taylor & Francis Group, ISBN 978-1-138-02945-3
- Brignoli ML, Espa P, Quadroni S, Crosa G, Gentili G, Batalla RJ (2016). Experiences of controlled sediment flushing from four alpine reservoirs. In: River Sedimentation. Wieprecht S, Haun S, Weber K, Noack M & Terheiden K eds. p. 983-990, Leiden (The Netherlands): CRC Press / Balkema, Taylor & Francis Group, ISBN 978-1-138-02945-3
- Espa P, Brignoli ML, Previde Prato A, Castelli E, Crosa G, Gentili G, Bondiolotti F (2011). Controlled sediment flushing of Cancano reservoir. In: Dams and Reservoirs under Changing Challenges. Schleiss AJ and Boes RM eds. p. 395-402, London: CRC Press, Taylor & Francis Group, ISBN: 9780415682671
- Espa P., Sibilla S (2005). Local scour downstream of an apron for intermediate tailwater depth conditions. In: Water Engineering for the Future: Choices and Challenges. Jun BH, Lee SI, Seo IW, and Choi GW eds. p. 1602-1613, Seoul: Korea Water Resources Association, ISBN: 9788987898254
- Espa P, Magini R (1995). Experimental investigation of 3D separation in a cylinder rough flat plate junction. In: UNSTEADY FLOWS – 1995. Keith WL, Tsukamoto H, Baysal O, and Wei T eds. p. 151-156, New York: the American Society of Mechanical Engineers (ASME).

International Conferences

- Espa P, Petaccia G, Gentili G, Previde Prato A (2016). 2-D habitat modeling of a river reach subjected to Minimum Flow release: the Ticino River below Lake Maggiore (Italy). NET-SCARCE International Conference RIVERS UNDER WATER SCARCITY: Threats and Challenges, Barcelona, Spain, November 15-16
- Quadroni S, Crosa G, Gentili G, Espa P (2016). Hydropower use and ecological quality of streams in the central Italian Alps: Current status and future challenges. NET-SCARCE International Conference RIVERS UNDER WATER SCARCITY: Threats and Challenges, Barcelona, Spain, November 15-16
- Quadroni S, Crosa G, Espa P, Gentili G, Zaccara S (2014). Eco-hydraulic survey of streams and rivers highly exploited for hydropower in the Central Italian Alps. Proceedings of ISE 2014 - 10th International Symposium on Ecohydraulics, no. 231, p. 1-8, Trondheim, Norway, June 23-27
- Salmaso F, Crosa G, Espa P, Gentili G, Zaccara S (2014). Eco-hydraulic survey of a highly regulated large Italian river. Proceedings of ISE 2014 - 10th International Symposium on Ecohydraulics, no. 192, p. 1-8, Trondheim, Norway, June 23-27
- Espa P, Brignoli ML, Crosa G, Gentili G, Previde Prato A, Quadroni S (2012). Field Investigation of Controlled Sediment Flushing at Sernio Pondage. Proceedings of the 9th International Symposium on Ecohydraulics. ISBN: 9783200028623, Vienna, Austria, September 17-21
- Espa P, Castelli E, Crosa G, Gentili G (2009). Environmental Effects of Sediment Flushing from Artificial Reservoirs: Field Study on an Alpine Stream. Proceedings of the 33rd IAHR Congress. p. 3296-3303, ISBN: 9789490365011, Vancouver, British Columbia, Canada, 9-14 August 2009

- Espa P, Compare S, Crosa G, Bondiolotti F, Gentili G, Sibilla S (2008). Sediment flushing from an Alpine reservoir: hydraulic monitoring and biological impact. In: River Flow 2008 - Proceedings of the International Conference on Fluvial Hydraulics. vol. 2, p. 1191-1200, Ankara: KUBABA Congress Department and Travel Service, ISBN: 9786056013621, Çeşme (Turkey), 3-5 September 2008
- Sibilla S, Espa P (2008). SPH numerical simulation of local scour downstream of an apron. In: Altınakar M.S., Kokpınar M.A., Darama Y., Yegen E.B., Harmancıoğlu N.. River Flow 2008 - Proceedings of the International Conference on Fluvial Hydraulics. Çeşme (Turkey), 3-5 September 2008, vol. 3, p. 2067-2073, Ankara: KUBABA Congress Department and Travel Service, ISBN: 9786056013638
- Espa P, Bondiolotti F, Compare S, Crosa G, Gentili G (2007). Biological and hydraulic monitoring of sediment flushing from an alpine reservoir. In: Di Silvio G, Lanzoni S. Proceedings of the 32nd Congress of the International Association for Hydraulic Engineering and Research. Venezia, Italy, July 01-06 2007, p. 1243-1-1243-9, VENEZIA:CORILA, ISBN: 9788889405062
- Crosa G, Compare S, Gentili G, Bondiolotti F, Espa P (2007). Ecological effects of sediment flushing from reservoirs: experimental evidences from a case study. In: I. Jowett, B. Biggs. Proceedings of Ecohydraulics 2007 - 6th International Symposium on Ecohydraulics. Christchurch, New Zealand, February 19-23, 2007, p. 350-1-350-4
- Espa P, Sibilla S (2006). Experimental study of the scour regimes downstream of an apron for intermediate tailwater depths. In: Ferreira R. M. L., Alves E. C. T. L., Leal J. G. A. B., Cardoso A. H.. Proceedings of River Flow 2006 . Lisbon, Portugal, 6-8 September, 2006, vol. 2, p. 1715-1724, Leiden: Taylor & Francis / Balkema, ISBN: 9780415408158
- Espa P, Gallati M, Sibilla S (2003). Free surface perturbation induced by a vertical 2-D liquid jet introduced from the bottom of a rectangular tank: numerical study by SPH method. Proceedings of the XXX IAHR Congress. Thessaloniki, Greece, 24-29 August, 2003, vol. D, p. 567-574
- Espa P, Frattini A (2002). Experimental study of turbulent, 2-D, vertical jets in shallow water. Proceedings of the 11th International Symposium on Applications of Laser Techniques to Fluid Mechanics. Lisbon, Portugal, July 8-11 2002
- Espa P, Maddè S (2000). Numerical simulations of thermally forced 2-D flows in idealized valley cross-sections. Proceedings of the Ninth Conference on Mountain Meteorology. p. 134-139, Aspen (Colorado), 7-11 August
- Espa P, Maddè S (2000). Experimental investigation of 2-D free convection in a differentially heated trapezoidal cavity. Proceedings of the 9th International Symposium on flow visualization. p. 375/1-375/11, Edinburgh (UK), August 22-25
- Espa P (2000). Thermally forced atmospheric motions. Numerical simulations and laboratory model study. Proceedings of the International Symposium for the 10 Years of the IDNDR: “How near are we towards hydro-geological disaster reduction”. July 17-21 2000, Perugia.

National Conferences

- Espa P, Brignoli ML, Previde Prato A, Crosa G, Quadroni S, Gentili G (2012). Rimozione di sedimenti per fluitazione controllata dal serbatoio di Sernio: studio del trasporto solido a valle dello sbarramento. Atti del XXXIII Convegno di Idraulica e Costruzioni Idrauliche. Cosenza:Edibios, ISBN: 9788897181187, Brescia, 10-15 settembre 2012

- Moroni D, Crosa G, Espa P (2012). Esperienze e strategie di mitigazione nella gestione dell'interrimento dei serbatoi in Provincia di Sondrio - Il progetto ECOIDRO. Atti di Riqualificazione fluviale e gestione del territorio. p. 347-356, Bozen-Bolzano University Press, ISBN: 9788860460547, Bolzano, 6-7 novembre 2012
- Espa P, Brignoli ML, Previde Prato A, Castelli E, Crosa G, Gentili G (2010). Rimozione di sedimenti per fluitazione dal serbatoio di Sernio (SO). Atti del XXXII Convegno di Idraulica e Costruzioni Idrauliche. Palermo:Walter Farina Editore, ISBN: 9788890389528, Palermo, 14-17 Settembre 2010
- Espa P, Castelli E, Compare S, Crosa G, Gentili G (2008). Misura della concentrazione di solidi sospesi nelle fluitazioni di sedimento da bacini artificiali. Atti di Idra 2008 - 31° Convegno Nazionale di Idraulica e Costruzioni Idrauliche. Perugia, 9-12 Settembre 2008, p. 1-8, PERUGIA:Morlacchi Editore, ISBN: 9788860742209
- Espa P, Sibilla S (2006). Studio sperimentale dei regimi di scavo a valle di una piastra di protezione in condizioni intermedie di sommergenza. Atti del XXX Convegno di Idraulica e Costruzioni Idrauliche. p. (L345) 1-(L345) 15, ROMA:Casa Editrice Università La Sapienza, ISBN: 9788887242812, Roma, 10-15 Settembre, 2006
- Espa P, Sibilla S (2004). Flusso turbolento indotto da un getto verticale piano immerso dal fondo di un recipiente a pelo libero di modesta profondità. Atti del 29° Convegno Nazionale di Idraulica e Costruzioni Idrauliche. vol. 1, p. 141-148, CASTROLIBERO (CS):Editoriale BIOS, ISBN: 9788877403827, Trento, 7-10 set. 2004
- Espa P, Sibilla S (2002). Studio sperimentale e numerico di getti bidimensionali entro vasche a pelo libero costante. Atti del XXVIII Convegno Nazionale di Idraulica e Costruzioni Idrauliche. p. 609-618, Potenza
- Espa P, Gallati M, Sibilla S (2002). Interazione con la superficie libera di un getto liquido piano immerso dal fondo di una vasca rettangolare. Atti del X Congresso Nazionale A.I.VE.LA.. Ancona, 4-5 novembre 2002, p. 11-30
- Espa P, Magini R (2000). Erosione localizzata al piede di ostacoli in alveo: studio sperimentale su un dispositivo di controllo. Atti del XXVII Convegno di Idraulica e Costruzioni Idrauliche. vol. III, p. 355-362, Genova, 12-15 settembre 2000
- Espa P, Magini R. (1995). Caratteristiche di non stazionarietà nel flusso separato al piede di ostacoli cilindrici. Atti del III Convegno Nazionale A.I.Ve.La., Ancona, 27/28 giugno 1995

Reviewing for international journals

- Science of the Total Environment
- Journal of Environmental Management
- River Research and Applications
- Canadian Journal of Fisheries and Aquatic Sciences
- Water Resources Research
- Desalination and Water Treatment

Teaching

- Hydraulics and Hydraulic Structures (9 CFU, Insubria University, Degree in Environmental and Safety Engineering, 2011-present)

- Hydropower plants (3 CFU, University of Pavia, Master Degree in Environmental Engineering, Civil Engineering, and Electrical Engineering, 2007-present)
- Eco-hydraulics (6 CFU, Insubria University, Master Degree in Ecological Sciences, 2012)
- Hydraulic Structures (5 CFU, Insubria University, Degree in Environmental and Safety Engineering, 2004-2011)
- Fluid Mechanics (5 CFU, Insubria University, Degree in Environmental and Safety Engineering, 2004-2011)
- River Hydraulics (6 CFU, University of Pavia, Degree in Hydro-geological Protection Engineering, 2003)

Academic management

- Vice-president of the Degree in Environmental and Safety Engineering at the Insubria University (2013-present)
- Erasmus coordinator of the Degree in Environmental and Safety Engineering at the Insubria University (2013-present)