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Biography

Dr. Gérard-Philippe Zéhil holds a degree in Civil Engineering from Saint Joseph University (USJ), (ESIB, Lebanon, 2002) with focus on Infrastructure and Transport. Zéhil also holds an advanced Postgraduate Professional Degree in Structural Engineering from the Centre des Hautes Études de la Construction (Paris, France, 2003) with focus on Reinforced and Prestressed Concrete, and a Ph.D. in Civil Engineering from Duke University (Durham, N.C., U.S.A., 2013) with focus on Materials and Structures.

Zéhil has many years of practical professional experience, both in the industry and in academia. In the industry, he served as a Bridge Design Engineer and a Project Manager, mainly in France. Zéhil has technical experience in the practical implementation of construction materials and composites in structures, such as bridges, footbridges, cut and cover constructions, tunnels, earth and water retaining structures, and their foundations. He contributed to the design and construction of several technically challenging structures in Europe, including the famous Trois Bassins Bridge on the French Island of Réunion.

Zéhil's academic research activity focuses on developing and modeling new materials, structural elements, and components, for applications in civil engineering structures, and in other fields. His work draws upon and impacts the fields of computational mechanics, contact mechanics, material modeling in finite strain, linear and nonlinear viscoelasticity, material damage and recovery, damage induced anisotropy, soft materials, rolling resistance, composite structures, structural dynamics, blast dynamics and fluid-structure interactions. He is also involved in applying artificial intelligence and machine learning techniques to the field of structures and materials.

Peer-reviewed Journals

International

- Nancy Dib, G.-P. Zéhil & S. Rigby (2022), "On the blast-wave shielding effect of porous buildings," Journal of Fluids and Structures, 115, 103787. DOI: https://doi.org/10.1016/j.jfluidstructs.2022.103787
- P. Matar, G.-P. Zéhil, J. Assaad & T. Barkaya (2021), "Use of polypropylene fibers in concrete fabricated with recycled aggregates," Vestnik of Tver State Technical University. Series "Building. Electrical Engineering and Chemical Technology," 1(9), 14–24. DOI: https://doi.org/10.46573/2658-7459-2021-1-14-24
- C. Ghnatios, G.-P. Zéhil & C. Habchi (2021), "Modeling of the vane test using a power-law fluid and model order reduction techniques: application to the identification of cement paste properties," Comptes Rendus Mécanique, 349(3), 501–517. DOI: https://doi.org/10.5802/crmeca.97
- Nancy Dib & G.-P. Zéhil (2021), "Generalized modeling of the effective thermal conductivity of particulate composites," Materials Today Communications, 27, 102283. DOI: https://doi.org/10.1016/j.mtcomm.2021.102283
- P. Matar & G.-P. Zéhil (2020), "Effects of polypropylene fibers on the physical and mechanical properties of recycled aggregate concrete," Journal of Wuhan University of Technology - Materials Science Edition, 34(6), 1327–1344. DOI: https://doi.org/10.1007/s11595-019-2196-6

- G.-P. Zéhil, C. Ghnatios & R. Himo (2020), "Soft computing approaches to homogenized properties of inclusion-modified concrete mixtures: Application to XLPE-modified concrete," Journal of Building Engineering, 29, 101161 (16 pages) DOI: https://doi.org/10.1016/j.jobe.2019.101161
- G.-P. Zéhil & H.P. Gavin (2019), "Rolling resistance of a hard sphere on rubber sheets: limitations of linear viscoelastic modeling and influence of nonlinearities," International Journal of Applied Mechanics, 11(7) DOI: https://doi.org/10.1142/S1758825119500662
- G.-P. Zéhil & J. Assaad (2019), "Feasibility of concrete mixtures containing cross-linked polyethylene waste materials," Construction and Building Materials, 226, 1–10. DOI: https://doi.org/10.1016/j.conbuildmat.2019.07.285
- G.-P. Zéhil & H.P. Gavin (2019), "The effect of boundary condition variations on the rolling resistance of a hard sphere on rubber sheets," International Journal of Applied Mechanics, 11(5), 1950043 (25 pages) DOI: https://doi.org/10.1142/S1758825119500431
- J. Assaad, E. Chakar & G.-P. Zéhil (2018), "Testing and modeling the behavior of sandwich lightweight panels against wind and seismic loads," Engineering Structures, 175, 457–466. DOI: https://doi.org/10.1016/j.engstruct.2018.08.041
- E. Silverstein, S. Freedman, G.-P. Zéhil, K. Jiramongkolchai, M. El-Dairi (2016), "The macula in pediatric glaucoma: quantifying the inner and outer layers via optical coherence tomography automatic segmentation," Journal of AAPOS, 20(4) 332–336. http://dx.doi.org/10.1016/j.jaapos.2016.05.013
- G.-P. Zéhil & H.P. Gavin (2014), "Two and three-dimensional boundary element formulations of compressible isotropic, transversely isotropic and orthotropic viscoelastic layers of arbitrary thickness, applied to the rolling resistance of rigid cylinders and spheres," European Journal of Mechanics – A/Solids, 44, 175–187. https://doi.org/10.1016/j.euromechsol.2013.10.015
- G.-P. Zéhil & H.P. Gavin (2014), "Rolling resistance of a rigid sphere with viscoelastic coatings," International Journal of Solids and Structures, 51, 822–838. https://doi.org/10.1016/j.ijsolstr.2013.11.009
- P.S. Harvey, G.-P. Zéhil & H.P. Gavin (2014), "Experimental validation of simplified models for rolling isolation systems," Earthquake Engineering and Structural Dynamics, 43, 1067–1088. http://dx.doi.org/10.1002/eqe.2387
- G.-P. Zéhil & H.P. Gavin (2013), "Three-dimensional boundary element formulation of an incompressible viscoelastic layer of finite thickness applied to the rolling resistance of a rigid sphere," International Journal of Solids and Structures, 50(6), 833–842. https://doi.org/10.1016/j.ijsolstr.2012.11.020
- G.-P. Zéhil & H.P. Gavin (2013), "Simple algorithms for solving steady-state frictional rolling contact problems in two and three dimensions," International Journal of Solids and Structures, 50(6), 843–852. https://doi.org/10.1016/j.ijsolstr.2012.11.021
- G.-P. Zéhil & H.P. Gavin (2013), "Simplified approaches to viscoelastic rolling resistance," International Journal of Solids and Structures, 50(6), 853–862. https://doi.org/10.1016/j.ijsolstr.2012.09.025
- G.-P. Zéhil & H.P. Gavin (2013), "Unified constitutive modeling of rubber-like materials under diverse loading conditions," International Journal of Engineering Science, 62, 90–105. https://doi.org/10.1016/j.ijengsci.2012.09.002

Peer-reviewed Conference Proceedings

International

- G.-P. Zéhil (2023), "On the intermediate-field blast wave shielding effect of a porous wall," 5th International Conference on Advances in Computational Tools for Engineering Applications (ACTEA '23), Lebanon, July 5 – 7. https://doi.org/10.1109/ACTEA58025.2023.10193988
- G.-P. Zéhil & Nancy Dib (2023), "A brief review of simplified modeling approaches commonly used in engineering," 5th International Conference on Advances in Computational Tools for Engineering Applications (ACTEA'23), Lebanon, July 5 – 7. https://doi.org/10.1109/ACTEA58025.2023.10194146
- Christine Saab & G.-P. Zéhil (2023), "About machine learning techniques in water quality monitoring," 5th International Conference on Advances in Computational Tools for Engineering Applications (ACTEA'23), Lebanon, July 5 – 7. https://doi.org/10.1109/ACTEA58025.2023.10193911
- R. Himo, G.-P. Zéhil & C. Ghnatios (2019), "2D modeling of the thermal conductivity of XLPE modified concrete," Congrès Annuel de la Société Française de Thermique (SFT 2019), Nantes, France, June 3 – 6. http://www.sft.asso.fr/Local/gus/files/436/actes-web-1019.pdf
- C. Ghnatios & G.-P. Zéhil (2019), "Estimation of power-law rheological parameters for non-Newtonian fluids using the vane test," 4th International Conference on Advances in Computational Tools for Engineering Applications (ACTEA'19), Lebanon, July 3 – 5. DOI: https://doi.org/10.1109/ACTEA.2019.8851103
- G.-P. Zéhil (2019), "Efficient modeling of the thermal-cracking of a cylindrical shell encapsulating a cylinder inclusion," 4th International Conference on Advances in Computational Tools for Engineering Applications (ACTEA'19), Lebanon, July 3 – 5. DOI: https://doi.org/10.1109/ACTEA.2019.8851113
- G.-P. Zéhil (2019), "Efficient modeling of the thermal-cracking of a spherical shell encapsulating a round inclusion," 4th International Conference on Energy Engineering and Smart Materials (ICEESM 2019), Dublin, Ireland, June 30 – July 2. DOI: https://doi.org/10.4028/www.scientific.net/MSF.995.214

- G.-P. Zéhil & Daisy Saba (2018), "Exploring XLPE-concrete as a novel sustainable construction material," 3rd International Conference on Energy Engineering and Smart Materials (ICEESM 2018), Milan, Italy, June 22 – 24, p. 030005-1 – 5. DOI: https://doi.org/10.1063/1.5051105
- Ghnatios, C., G.-P. Zéhil (2017), "3D modeling of the vane test on a power-law cement paste by means of the proper generalized decomposition," 14th International Conference on Computational Plasticity. Fundamentals and Applications – COMPLAS XIV, E. Oñate, D.R.J. Owen, D. Peric & M. Chiumenti (Eds). https://congress.cimne.com/complas2017/frontal/Doc/EbookCOMPLAS2017.pdf
- G.-P. Zéhil (2016), "Semi-analytical model for the mechanical behavior of a spinning viscoelastic layer under gravity loads," 3rd International Conference on Advances in Computational Tools for Engineering Applications (ACTEA'16), Lebanon, July 13 – 15, p. 125 – 130. https://doi.org/10.1109/ACTEA.2016.7560125
- G.-P. Zéhil (2016), "A combined analytical and computational approach to the structural behavior of composite tubes," 3rd International Conference on Advances in Computational Tools for Engineering Applications (ACTEA'16), Lebanon, July 13 – 15, p. 146 – 151. https://doi.org/10.1109/ACTEA.2016.7560129
- N. Khoury, Y. Maalouf, S. Ghanimeh, G.-P. Zéhil (2016), "Computer-Aided Measurements of the Electrical Resistivity Fields in Concrete Mixtures with and without Polyethylene Terephthalate," 3rd International Conference on Advances in Computational Tools for Engineering Applications (ACTEA'16), Lebanon, July 13 – 15, p. 72 – 76. https://doi.org/10.1109/ACTEA.2016.7560114
- H.P. Gavin, G.-P. Zéhil, and Harvey, P.S (2014), Experimental verification of a rolling isolation system. 10th U.S. National Conference on Earthquake Engineering, Anchorage, Alaska, USA. http://www.proceedings.com/24968.html

Research Grants

Principal investigator (PI) of a (2018-2019) research project entitled "Novel approach to recycling XLPE as a substitute to concrete aggregates – Influence on the behavioral properties of XLPE concrete," supported by a LL 18,500,000 research grant (ref. 364/Sad) from the National Council for Scientific Research (CNRS-L).

Presentations and Seminars

- Notre Dame University - Louaize (NDU), July 14, 2023, "On surrogate modeling in engineering," at the Surrogate and Machine Learning in Engineering Seminar.
- Open Map Lebanon – University of Balamand Joint International Conference, November 6, 2020, "Introduction to the Blast Modeling Panel."
- Open Map Lebanon – University of Balamand Joint International Conference, November 6, 2020, "Interpreting the progress of the COVID-19 epidemic, in Lebanon."
- Notre-Dame de Jamhour, Promo 94, Webinar Series, September 17, 2020, "COVID 19 epidemic progress in Lebanon: A modeling perspective."
- Notre Dame University - Louaize (NDU) – UNICEF Lebanon Webinar, August 11, 2020, "Evolution of the COVID19 Epidemic in Lebanon (vs. World)."
- Florida Atlantic University, Boca Raton, Florida, USA, May 13, 2014, "Novel approaches to modeling viscoelastic materials and components; Rolling resistance; Synergistic structural composites."
- Notre Dame University – Louaize, Lebanon, April 14, 2014, "Novel approaches to modeling viscoelastic materials and components; Rolling resistance; Synergistic structural composites." (by video conference).
- The Catholic University of America, Washington DC, USA, February 19, 2014, "Novel approaches to modeling viscoelastic materials and components; Rolling resistance; Synergistic structural composites."
- North Carolina State University, Raleigh, North Carolina, February 6, 2014, "Novel approaches to modeling viscoelastic materials and components; Rolling resistance; Synergistic structural composites."
- University of Ottawa, Ottawa, Canada, January 24, 2014, "Novel approaches to modeling viscoelastic materials and components; Rolling resistance; Synergistic structural composites."
- Clarkson University, Potsdam, New York, USA, December 9, 2013, "Novel approaches to modeling viscoelastic materials and components; Rolling resistance; Synergistic structural composites."
- University of Colorado, Boulder, Colorado, USA, December 2, 2013, "Novel approaches to modeling viscoelastic materials and components; Rolling resistance; Synergistic structural composites."
- Lebanese University, Faculty of Engineering II, Ain Saadeh, Lebanon, January 21, 2010, "Combining the extradosed post-tensioning technique with the balanced segmental cantilever construction method."
- Université Saint-Joseph, Faculty of Engineering, Department of Civil and Environmental Engineering, Mar Roukoz, Lebanon, February 18, 2010, "Exceptional bridge crossing the Trois Bassins ravine on the French Reunion island: design and construction methodology."
- Centre des Hautes Etudes de la Construction, Paris, France, February 2, 2008, "Polypropylene fibered concrete tunnel on the RN314 in La Defense: resistance to fire and blasting."

- Centre des Hautes Etudes de la Construction, Paris, France, April 4, 2007, "Types of prestressing in bridge construction: a brief review."
- UBIFRANCE, the French Agency for International Business Development, Paris, France, November 9, 2006, "Bridge design and construction: update on the French expertise."
- COTEBA Engineering, Paris, France, October 27, 2006, "Combining longitudinal and transverse phasing in prestressed concrete bridges."

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