

EMI 2023 International Conference  
Palermo, August 27-30, 2023

Proposal for a Keynote lecture

**Title: Modeling and simulation of soil-structure-vehicle interaction of railway bridges subjected to high-speed trains**

**Presenter:** Christoph Adam

**Abstract:**

Bridge structures for high-speed trains are exposed to significant dynamic loading during the train passage. The main source of bridge resonance are the repetitive axle loads moving with critical speeds, which are transferred through the vehicle wheels to the structure, rail irregularities, and wheel hunting oscillations. In general, in a state of resonance the load bearing capacity of railway bridge structures is satisfied, however, the admissible bridge deck acceleration is exceeded. Large bridge deck accelerations may lead to ballast instability and to train derailment, and thus, it is often the limiting factor in the dynamic design of railway bridges.

Bridge, subsoil, track, and high-speed train represent an uncertain interacting dynamic system of high complexity with, in general, time-dependent system matrices. Thus, full reliability assessment of this system can only be conducted efficiently in an interdisciplinary approach, bringing together the disciplines of structural mechanics, engineering mathematics, and high performance computing. This contribution provides a summary on modeling issues of uncertain bridge-train interaction, its efficient simulation, and an outline of pros and cons of different strategies is provided.

**Short CV:**

Christoph Adam is a Professor of Applied Mechanics and Head of the Department of Basic Sciences in Engineering Sciences at Universität Innsbruck, Austria. His research interests include the fields of structural dynamics, structural control, earthquake engineering, soil dynamics, and system identification. He has co-authored about 300 papers in peer-reviewed journals and conference proceedings, and is currently a member of the editorial boards of several international journals in the field of applied mechanics. Christoph obtained his Dipl.-Ing. degree in civil engineering in 1990 and his PhD in 1994 from TU Wien and was a postdoc at Stanford University (Blume Center of Earthquake Engineering) and Associate Professor at TU Wien before joining Universität Innsbruck in 2006. For his habilitation thesis he was awarded the "Kardinal-Innitzer-Förderungspreis" in recognition of outstanding scientific performance. He serves as Chairman of Board of the Austrian Association for Earthquake Engineering and Structural Dynamics (OGE).