

## Numerical modelling of earthquake ground motion

Paola F. Antonietti (paola.antonietti@polimi.it)  
*MOX-Dipartimento di Matematica, Politecnico di Milano*

A number of challenging geophysical applications requires a flexible representation of the geometry and an accurate approximation of the solution field. Paradigmatic examples include seismic wave propagation phenomena and fractured reservoir simulations. The main challenges are i) the complexity of the physical domain, due to the presence of localized geological irregularities, alluvial basins, faults and fractures; ii) the heterogeneities in the medium, with significant and sharp contrasts; and iii) the coexistence of different physical models. The high-order discontinuous Galerkin (DG) Finite Element Method possesses the built-in flexibility to naturally accommodate both non-matching meshes, possibly made of polygonal and polyhedral elements, and high-order approximations in any space dimension. At the same time DG methods feature a high-level of intrinsic parallelism, making them well suited for large-scale computations on massively parallel architectures. In this talk, I will discuss recent advances in the development and analysis of high-order DG methods for the numerical approximation of seismic wave propagation phenomena. I will analyse the stability and the theoretical properties of the scheme and present some simulations of the earthquake ground motion induced by real large-scale seismic events in three-dimensional complex media. Further applications to flow in fractured porous media and fluid-structure interaction problems will also be briefly discussed.