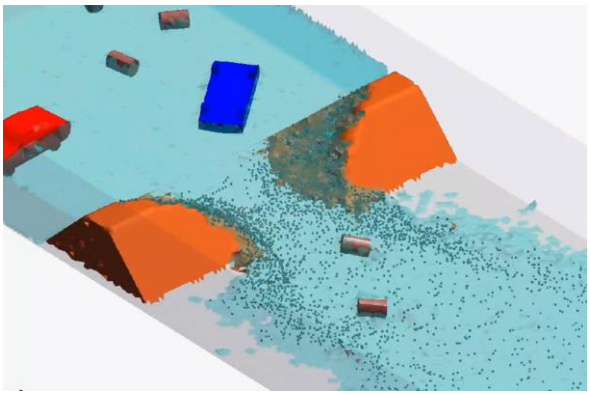
KTH SOLID MECHANICS KEYNOTE SEMINAR; Thursday, September 15th, 16.15; https://kth-se.zoom.us/j/69847032894

Eugenio Oñate

"Combination of particle-based methods and the FEM for solving multidisciplinary problems in engineering and applied sciences"

We present advances in the development and application of a new particle-discrete-finite element method (called PDFEM) based on the blending of an enhanced discrete element method (DEM, www.cimne.com/dempack) for non-cohesive and cohesive materials. the FEM and the Particle Finite Element Method (PFEM, www.cimne.com/pfem/). The PDFEM allows the study of flows incorporating particles of different sizes and their interaction with structures, accounting for frictional contact and multi-fracture effects. The main goal is to solve particulate fluid-solid-structure interaction problems at the scales that are necessary for predicting the response of the system with accuracy and reliability. The PDFEM uses a Lagrangian description to model the motion of the physical particles within a fluid and nodes ("virtual particles") in both the interacting fluid and the solid domains. These domains are discretized with a mesh in which the governing equations for the corresponding continuum problem (i.e. a fluid or a solid) are solved using the FEM. The analysis mesh is re-generated at each time step. The interaction between the discrete particles with the underlying fluid is modelled via an embedded technique. Structural failure is predicted using a combination of FEM and DEM procedures. In the lecture we present applications of the PDFEM to several problems in civil, environmental, marine & mechanical engineering. toughness. This work was performed in collaboration with Christian Peco, now at Penn State University, and Yingjie Liu, now at Cubist.



Professor Eugenio Oñate is a Civil Engineer. His research has focused on the development of numerical methods for analysis and design of structures, fluid dynamics and industrial manufacturing processes.
He has published 469 articles in JCR journals. He is author of 3 text books and editor of 59 books on different topics of computational mechanics. He is editor of the journals Archives of Computational Methods in Engineering (Springer), Computational Particle Mechanics (Springer) and Métodos Numéricos para Cálculo y Diseño en Ingeniería (Scipedia). He has supervised 68 PhDs (completed). Since 1987, he has been the founder and vicepresident of CIMNE. He was a founder and first president of the Spanish Society of Numerical Methods in Engineering, founder and president of the European Community for Computational Mechanics in Applied Sciences and president of the International Association for Computational Mechanics. He has received numerous awards at international level. He has promoted the creation of several technology-based companies in Spain.
More details can be found at www.cimne.com/eo