

# SEMM Seminar

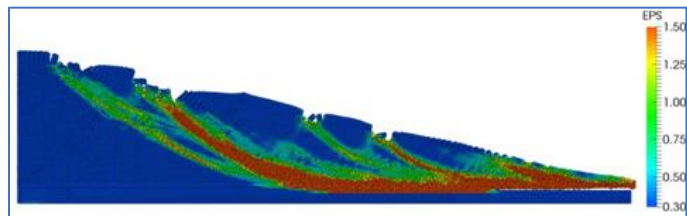
## A Semi-Lagrangian RKPM for Multiscale Fracture-Damage Modeling of Multiphase Porous Media: From Landslide to Fracking

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Monday, April 12, 12 – 1 pm via ZOOM\*

**Abstract:** Despite considerable efforts made in the development of advanced computational methods, the simulation of severe damage processes in porous media (such as fracking and landslide) remains challenging due to the complex material



damage mechanisms, extreme deformations as well as hydro-mechanical couplings of water, air and solid in geomaterials. This work presents a stabilized semi-Lagrangian Reproducing Kernel Particle Method (RKPM) for mixed hydro-mechanical simulation. A damage particle method is introduced to approximate fractures by a set of damaged particles. A micro-crack informed anisotropic permeability model is formulated to describe the enhanced fluid flow along crack paths. Finally, the proposed meshfree computational framework is applied to the simulations of fracking processes and landslide events with results validated against experimental observations.

**Bio:** J. S. Chen is the William Prager Chair Professor of Structural Engineering Department, Professor of Mechanical and Aerospace Engineering Department, and the Director of Center for Extreme Events Research at UC San Diego. Before joining UCSD in October 2013, he was the Chancellor's Professor of UCLA Civil & Environmental Engineering Department where he served as the Department Chair during 2007-2012. J. S. Chen's research is in computational mechanics and multiscale materials modeling with specialization in the development of meshfree methods. He is the Past President of US Association for Computational Mechanics (USACM) and the Past Present of ASCE Engineering Mechanics Institute (EMI). He has received the Computational Mechanics Award from International Association for Computational Mechanics (IACM), ICACE Award from International Chinese Association for Computational Mechanics (ICACM), the Ted Belytschko Applied Mechanics Award from ASME Applied Mechanics Division, the Belytschko Medal, U.S. Association for Computational Mechanics (USACM), among others. He is the Fellow of USACM, IACM, ASME, EMI, SES, ICACM, and ICCEES.



\*URL: <https://berkeley.zoom.us/j/97852094677?pwd=LzVhU1NuWUJ6NFh1cDkzaEo4c1Jadz09>