

UNIVERSITY of HOUSTON

CULLEN COLLEGE of ENGINEERING

Department of Civil & Environmental Engineering

CIVE 6111 Graduate Seminar Series

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Massachusetts Institute of Technology

Cementing in the Oil & Gas Field – Bottom-Up

Monday, December 1, 2014

10:30 am - 11:30 am

Room: D3 W205

Abstract

With ever more challenging (T,p) environments for cementing applications specifically in shale gas applications, there is a need to change the classical paradigm for design and safe operation of cement liners. In particular, the risk of leakage of gas wells warrants rethinking the current design of cement liners. In this talk, I present essential elements of engineering science. Starting at the molecular scale of calcium-silicate-hydrates (C-S-H), I will discuss means of propagating this understanding via coarse graining (upscaling) methods to the meso- and macroscale, and ultimately the field-scale of engineering applications. I will argue that recent insights into molecular properties and colloidal interactions of cement hydrates provides a strong backbone for a shift of paradigm, moving away from strength theory design toward a poroelastic fracture design; to ensure zonal isolation and minimize gas leakage risks.

About the speaker:



Dr. Franz-Josef Ulm is Professor of Civil & Environmental Engineering at MIT. He received his undergraduate education at the Technical University of Munich, Germany; a PhD. From Ecole Nationale des Ponts et Chaussees, Paris, France; and habilitation degree from Ecole Normale Supérieure de Cachan, France. At MIT, he is the faculty director of the Concrete Sustainability Hub (cshub@mit); of the X-Shale Hub, an industry-academia partnership enabled through MIT's Energy Initiative, dedicated to the sciences and engineering of gas shale; and co-director of the mixed research unit between CNRS and MIT.