Abstract:

In this talk I will derive a PDE system describing the behavior of a cement mixture of gypsum, slaked lime and sulfuric acid with gypsum creating chemical reaction. After a quick introduction of the necessary coordinates systems and derivatives I will use continuity equations, diffusion and viscoelasticity to derive a general incompressible model. I will use both diffusion and viscoelasticity to show how the usual regularizations of transport equations and backward parabolic equations can be interpreted. For an infinite plate of cement I will derive a 1D PDE system from the general incompressible model and show some numerical results I obtained. Lastly I will outline possible extensions of the model that either incorporates temperature or a porous media microstructure. This research was done jointly with Prof. Adrian Muntean (Karlstad Univ.), Prof. em. Fons van de Ven (TU Eindhoven) and Dr. Jan Zeman (TU Prague).