



Wolfson Department of Chemical Engineering Special Seminar

Lecture Hall 6, Wolfson Department of Chemical Engineering,

Wednesday January 10th at 2:30pm

Memorial lecture in honor of Prof. Eli Rubin

Prof. Pavel Bedrikovetsky

*Australian School of Petroleum, The University of Adelaide
Australia*

**Suspension-colloidal transport in porous media:
petroleum and environmental applications**

Flow of suspensions and colloids in porous media with particle capture, detachment and consequent permeability alteration occurs in aquifers and subterranean basins during exploitation of artesian wells, disposal of industrial wastes in aquifers and consequent contamination, fresh and hot water storage in aquifers and geothermal reservoirs, ocean water invasion into aquifers, industrial filtering, as well as exploitation of oil and gas production and injection wells.

We discuss the particulate transport in rocks with fines attachment and detachment accounting for particle- and pore size distributions. The basic equations form a stochastic population-balance system. The system can be upscaled in the cases of mono-sized particles and of small-concentrations. 1D linear and axi-symmetric problems for suspension injection or detachment of natural reservoir fines allow for exact solutions. The solutions allow analysing the propagation of concentration waves of injected colloids or lifted suspensions, its effects on well injectivity and productivity. The exact solutions allow also for downscaling, i.e. restoration of the micro-scale behaviour. Another application of the exact solutions is regularisation of inverse problems, allowing interpreting laboratory experiments and tuning the model parameters. We show simple lab and field devices for complete characterisation of suspension-colloidal system and lab-based reservoir-scale predictions.

The talk is completed by exploration of random-walk and Boltzmann's models, and of two-phase suspension-colloidal transport.

Refreshments will be served at 2:15pm