Title: Coarse-grained model of CFD-DEM for sand production

Abstract: Sand production is an important issue for many hydrocarbon recovery applications in unconsolidated reservoirs. Computational Fluid Dynamics coupled with Discrete Element Method (CFD-DEM) model captures micro-scale features of sand transport problems. In this talk, a coarse-graining approach of 3D CFD-DEM model is developed for the sand production phenomenon using the sample based on the particle size distribution (PSD) from the Kazakhstan reservoir field. The derivation of scaling from a fine to a coarse model is presented. The original (fine scale) model is validated to the laboratory results including the sand production rate. The results of the original model is compared to the SSW and SSP coarse-gained models. The SSW model results agrees with the result of the sand production rate for the original system. We also observe a good match of the fluid velocity streamline and the produced particle distribution between the original and the coarse models. The speedup of the coarse model is up to 9.4 in the parallelized coarse-grained model.

Photo:



Short Info: He is currently an Assistant Professor at the Department of Mathematics, Nazarbayev University, Kazakhstan. He received a Ph.D. in Computational Science, Engineering and Mathematics (CSEM) at the Oden Institute for Computational Engineering and Sciences (OICES) in the University of Texas at Austin, where he was at the Center for Subsurface Modeling.

His research interest on multiscale numerical methods in subsurface applications. His research focus on the numerical analysis of partial differential systems that arise in subsurface phenomena using mathematical modeling and scientific computation. His main interests are finite element methods, numerical analysis including a priori and a posteriori error analysis, scientific computing, computational transport phenomena and numerical reservoir simulations.