



Contribution ID: 321

Type: Oral 20 Minutes

## A one-domain approach for modeling and simulation of free fluid over a porous medium

*Thursday, 17 May 2018 08:50 (15 minutes)*

In this talk we will introduce a one-domain approach based on the Brinkman model for the modeling and simulation of the transport phenomenon between free fluid and a porous medium. A thin transition layer is introduced between the free fluid region and the porous media region, across which the porosity and permeability undergo a rapid but continuous change. We study the behavior of the solution to the one-domain model analytically and numerically. Using the method of matched asymptotic expansion, we recover the Beavers-Joseph-Saffman (BJS) interface condition as the thickness of the transition layer goes to zero. We also calculate the error estimates between the leading order solution of the one-domain model and the standard Darcy-Stokes model of two-domain model with the BJS condition. Numerical methods are developed for both the one-domain model and the two-domain model. Numerical results are presented to support the analytical results, thereby justifying the one-domain model as a good approximation to the two domain Stokes-Darcy model.

### References

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**Session Classification:** Parallel 9-H

**Track Classification:** MS 2.02: Modeling and simulation of subsurface flow at various scales