

Poroelastic Plate Model Obtained by Simultaneous Homogenization and Dimension Reduction

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Abstract

In this talk, we consider a coupled system of linear elasticity and the Stokes equations as the starting point of our analysis. The model depends on two small parameters: the thickness h of the plate and the pore scale ε , which in general depends on h . We focus on the regime in which the pore size is small compared to the plate thickness.

Our main goal is to derive an effective poroelastic plate model from the three-dimensional problem in the limit as $h \rightarrow 0$, by combining simultaneous homogenization and dimension reduction techniques. The resulting model extends the poroelastic plate model derived by Mikelić et al. [1] from the three-dimensional Biot system by dimension reduction. In particular, it also includes the case of contact between poroelastic and (poro)elastic plates, as well as the corresponding evolution equation with an inertial term.

References

- [1] A. Mikelić, M. F. Wheeler, and T. Wick, Derivation of a poroelastic plate model from 3D Biot's equations, *Arch. Ration. Mech. Anal.* **215** (2015), 1035–1062.