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Boundary conditions between poro-elastic medium and pure fluid in multi-scale modelling. UGIS LACIS, SHERVIN BAGHERI, Linne Flow Centre, KTH Mechanics, 10044 Stockholm, Sweden — Accurate modelling of porous and poro-elastic media has been a long standing issue in geophysics, fluid mechanics, and biology. There has been a notable development of continuous models for both porous and poro-elastic materials, nevertheless there is still an on-going debate about the modelling of effective boundary conditions between different types of media, such as, poro-elastic medium and free fluid, porous medium and solid wall. Some recent works have rigorously treated interface between porous medium and free fluid, however, there have been no detailed investigation regarding the interface between poro-elastic medium and free fluid. We use the multi-scale modelling to arrive with averaged, effective macroscopic equations for description of a poro-elastic medium. Then we investigate the interface in detail and arrive with effective boundary conditions. To validate our model, we construct direct numerical simulations using an immersed boundary (IB) method. The IB method is beforehand validated with respect to theoretical predictions for Darcy's flow in porous materials with a given pore structure.

Ugis Lacis
Royal Inst of Tech

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