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Numerical study of Taylor-Couette flow with a porous inner cylinder SEMMA EL ALAMI, Hassan I University, Morocco, KARIM BOUROUNI, El Manar University, Tunisia, ERIC SERRE, MSNM-GP CNRS, France, RICHARD LUEPTOW, Northwestern University, USA — During the operation of a rotating filter consisting of a porous rotating inner cylinder and a non-porous outer cylinder, the Taylor vortices generated between the two coaxial cylinders are altered. The numerical study of this kind of filtration process requires the development of rigorous and robust numerical model which takes account of the interaction between the fluid and the porous medium of the membrane filter. In this work, the effect of permeability on Taylor–Couette flow with rotating inner wall and an imposed axial flow is investigated (radius ratio of $\eta = 0.85$ and length-to-gap ratio of $\Gamma = 16$). The thickness of porous medium may be variable into the gap between the cylinders. The results show a strong dependence of the flow structure with the permeability of the porous medium. We distinguish two regimes: one is characterized by a linear evolution of the critical Taylor with permeability; the second one is a transition to a horizontal branch for Ta=1350. This change affects significantly the mass transfer at the outlet of the membrane.

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