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Multiphase modeling of precipitation-induced membrane formation[1] PATRICK EASTHAM, NICK MOORE, NICK COGAN, Department of Mathematics, Florida State University, QINGPU WANG, OLIVER STEINBOCK, Department of Chemistry and Biochemistry, Florida State University — We have formulated a model for the dynamic growth of a membrane developing in a flow as the result of a precipitation reaction, a situation inspired by recent microfluidic experiments. A key challenge is that the location of the immobile membrane is unknown *a priori*. To model this situation,we use a multiphase framework with fluid and membrane phases; the aqueous chemicals exist as scalar fields that react within the fluid to induce phase change. Analysis demonstrates no-slip behavior on the developing membrane without *a priori* assumptions on its location, with additional numerical simulation in 2D microfluidic geometries. The model has applications towards precipitate reactions where the precipitate greatly affects the surrounding flow, a situation appearing in many laboratory and geophysical contexts. More generally, this model can be used to address fluid-structure interaction problems that feature the dynamic generation of structures.

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