明治大学先端数理科学インスティテュート

MIMS現象数理カフェセミナー

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場所：中野キャンパス8階　談話室

Gelation-Induced Dynamics of an Injected Fluid: Effects of Embedded Structures

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Abstract：Interfacial instabilities have been extensively studied to elucidate the fluid dynamics observed in geophysical and engineering processes. The Saffman–Taylor instability is a representative example of such phenomena, where fingering patterns appear when a more viscous fluid is displaced by a less viscous one. In this study, we investigated gelation-induced dynamics—a type of interfacial instability involving viscosity enhancement through chemical reactions—using experiments and a mathematical model. A fluid was injected into another using a syringe pump. Although the two fluids initially have the same viscosity, mixing of two fluid lead to an increase in viscosity at the interface due to gelation. As a result, a meandering motion of the injected fluid was observed. We discuss the characteristics of this dynamic behavior and demonstrate that the meandering can be suppressed by introducing embedded periodic structures, based on experimental observations and a simplified mathematical model.

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