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Bubble transport in bifurcations JOSEPH BULL, Tulane University, ADNAN QAMAR, King Abdullah University of Science and Technology — Motivated by a developmental gas embolotherapy technique for cancer treatment, we examine the transport of bubbles entrained in liquid. In gas embolotherapy, infarction of tumors is induced by selectively formed vascular gas bubbles that originate from acoustic vaporization of vascular droplets. In the case of non-functionalized droplets with the objective of vessel occlusion, the bubbles are transported by flow through vessel bifurcations, where they may split prior to eventually reach vessels small enough that they become lodged. This splitting behavior affects the distribution of bubbles and the efficacy of flow occlusion and the treatment. In these studies, we investigated bubble transport in bifurcations using computational and theoretical modeling. The model reproduces the variety of experimentally observed splitting behaviors. Splitting homogeneity and maximum shear stress along the vessel walls is predicted over a variety of physical parameters. Maximum shear stresses were found to decrease with increasing Reynolds number. The initial bubble length was found to affect the splitting behavior in the presence of gravitational asymmetry. This work was supported by NIH grant R01EB006476.

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