Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Transport of Concentrated Particles in Successively Bifurcating Vessels[1] YINGHUI LI[2], University of Minnesota, OMID AMILI[3], University of Toledo, FILIPPO COLETTI[4], University of Minnesota — With evolving imaging and computing technologies, the flow characteristics in successive bifurcating conduits have been extensively investigated to understand transport in the respiratory and cardiovascular systems. Specifically for tumor embolization, the ability to predict the fate of injected particles in bifurcating vessels is highly desirable to enable physicians to reach target sites. Predicting particle transport in such complex geometries is a challenging problem, and most past studies focused on very dilute regimes in which particles are not expected to alter the underlying flow. In the present study, we use particle tracking velocimetry to investigate the spatial distribution, velocity, acceleration, and dispersion of finite-size particles in a 4-generation bifurcating model. We consider a regime especially relevant to vascular embolization: a physiologic range of bulk flow Reynolds number and a suspension of neutrally buoyant particles of non-negligible size compared to the vessel diameter, reaching volume fractions up to a few percent. We explore how particles distribute among the distal branches and the influence of the release location. In addition, the effect of particle volume fraction is studied through Lagrangian statistics of the particle trajectories.

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Date submitted: 29 Jul 2020 Electronic form version 1.4