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A Porous Media Model for Blood Flow within Reticulated Foam

JASON ORTEGA, Lawrence Livermore National Laboratory — A porous media model is developed for non-Newtonian blood flow through reticulated foam at Reynolds numbers ranging from 10^{-8} to 10. This empirical model effectively divides the pressure gradient versus flow speed curve into three regimes, in which either the non-Newtonian viscous forces, the Newtonian viscous forces, or the inertial fluid forces are most prevalent. When compared to simulation data of blood flow through two reticulated foam geometries, the model adequately captures the pressure gradient within all three regimes, especially that within the Newtonian regime where blood transitions from a power-law to a constant viscosity fluid. This work was supported by the National Institutes of Health/National Institute of Biomedical Imaging and Bioengineering Grant R01EB000462 and partially performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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