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Magnetic Drug Targeting in Arterial Flows[1] ALICIA WILLIAMS, ISHWAR PURI, PAVLOS VLACHOS, Virginia Tech — Magnetic Drug Targeting (MDT) is a promising technique to effectively deliver medicinal drugs via functionalized magnetic particles to target sites during the treatment of diseases. In this paper we investigate the interaction of coronary and pulsatile flows laden with superparamagnetic microparticles in a vessel under the influence of a magnetic field induced by a 1 Tesla permanent magnet. Coronary and peripheral pulsatile flows were examined across a range of conditions that are representative of those found within the cardiovascular system. The flow in the model was measured using TRDPIV (Time Resolved Digital Particle Image Velocimetry) and data was acquired with sampling up to 1 kHz. The data obtained from the experiment indicates that for the range of flows studied, the behavior of the ferrofluid mass is physically abundant. The ferrofluid mass deforms in response to the pulsatility of the flow, generating wavy structures that ultimately shed portions of the ferrofluid downstream in a fashion similar to a Kelvin-Helmholtz shear layer. This experiment is the first to address the fluid dynamics of the interactions between the flow and the ferrofluid mass over the range of biological conditions.

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