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MR Velocimetry Protocols for Small Water-Filled Channels L. GUY RAGUIN, Department of Mechanical Engineering, Michigan State University, DIMITRIOS C. KARAMPINOS, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, LUISA CIOBANU, Biomedical Imaging Center, Beckman Institute for Advanced Science and Technology, University of Illinois at Urbana-Champaign, JOHN G. GEORGIADIS, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign — Unlike optical velocimetry methods, nuclear magnetic resonance (NMR) relaxes the requirement of having optical access to flow, and additionally allows multiple field-specific contrast mechanisms (fluid displacement, diffusion, chemical species, etc). For small channel networks, the trade-offs between spatial and temporal resolutions leads to the following conundrum: it is better to obtain spatially resolved velocity fields but only for slowly evolving flows, or temporally resolved average velocities in each of the small channels? To explore this issue, we compare a fast and localized NMR velocimetry technique based on multiple modulation multiple echoes (MMMEV), with classical NMR imaging velocimetry protocols (flow-compensated phase-contrast spin-echo, pulse-gradient spin-echo, and spin-tagging spin-echo) in a microchannel network.

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