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Validity of computational hemodynamics in human arteries based on 3D time-of-flight MR angiography and 2D electrocardiogram gated phase contrast images[1] HUIDAN (WHITNEY) YU, XI CHEN, ROU CHEN, Indiana University-Purdue University Indianapolis, ZHIQIANG WANG, Kent State University, CHEN LIN, STEPHEN KRALIK, School of Medicine, Indiana University, YE ZHAO, Kent State University — In this work, we demonstrate the validity of 4-D patient-specific computational hemodynamics (PSCH) based on 3-D time-of-flight (TOF) MR angiography (MRA) and 2-D electrocardiogram (ECG) gated phase contrast (PC) images. The mesoscale lattice Boltzmann method (LBM) is employed to segment morphological arterial geometry from TOF MRA, to extract velocity profiles from ECG PC images, and to simulate fluid dynamics on a unified GPU accelerated computational platform. Two healthy volunteers are recruited to participate in the study. For each volunteer, a 3-D high resolution TOF MRA image and 10 2-D ECG gated PC images are acquired to provide the morphological geometry and the time-varying flow velocity profiles for necessary inputs of the PSCH. Validation results will be presented through comparisons of LBM vs. 4D Flow Software for flow rates and LBM simulation vs. MRA measurement for blood flow velocity maps.

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