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**Full-Eulerian fluid-structure coupling simulation of hyperelastic channel flow**[1] NAOHIRO NAGANO, KAZUYASU SUGIYAMA, The Univ. of Tokyo, SHINTARO TAKEUCHI, Osaka Univ., SATOSHI II, SHU TAKAGI, YOICHIRO MATSUMOTO, The Univ. of Tokyo — A full-Eulerian simulation for coupling a Newtonian fluid and hyperelastic material is conducted. The system involves an interaction problem between the fluid and hyperelastic walls and is driven by pressure difference, mimicking a blood flow in a blood vessel. A single set of the governing equations for the fluid and solid is employed, and a volume-of-fluid idea is employed to describe a multi-component geometry. The solid stress is defined in Eulerian frame by using a left Cauchy-Green deformation tensor, and the temporal change in the solid deformation is described by updating the tensor. The method employs a uniform fixed grid system for both fluid and solid and it does not require any mesh generation or reconstruction, aiming at facilitating the practical bio-mechanical fluid-structure analysis based on a medical image. The validity of the simulation results is established through comparison with a theoretical prediction. As an application of the present method, pulsating flows are simulated to demonstrate a nonlinear behavior of the flow rate on the pulsating amplitude, and an effect of employing an anisotropic hyperelastic material is discussed.

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