Abstract

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Wall shear stress in the Navier-Stokes equation: A commentary

In a recent article (Xu et al. Computers in Biology and Medicine, 101(2018) p. 51-60) the authors denoted Wall Shear Stress (WSS) as a vector field implying that such field has an intrinsic spatial direction of action. Xu et al. [1] tested different boundary conditions of transient CFD models of internal carotid artery (ICA) aneurysm. The purpose of their study was mainly to investigate the effect of aging, as represented by the blood flow waveform, on simulated hemodynamics of ICA aneurysm. In Figure 5 of their article, the authors showed what is called “WSS vector plot” where they correlated the so-called direction of WSS field to the oscillatory shear index (OSI). The authors imply that WSS is a vector-tensor field that has a direction of action. This is not quite uncommon in the interdisciplinary field of biomedical engineering [2,3] where the origins and derivation of Navier-Stokes equation (NSE) might not be very clear.