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Abstract
Polyurethane (PU) heart valves provide central flow at peak systole. The associated hemodynamic characteristics are superior to that of mechanical valves with no anticoagulation therapy for patients. Durability performances, on the other hand, are also superior to those of biological valves. This paper analyzes blood flow characteristics of the PU heart valves at fully open position with computational fluid dynamics. These data provide information for the improvement of leaflets and leaflet support geometry to minimize the scale of recirculation zone. To simulate the hemodynamic characteristics of the blood flow, CFX-4.3 software with the finite volume method is utilized to analyze the three-dimensional Reynolds-averaged Navier-Stokes equations. By modifying the geometry of leaflets along with the supports, the scale of vortex flow and blood velocity are reduced obviously. Maximum flow velocity reduces 33% compared to that of original model at peak systole.
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