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New Outlet Conditions for Three-Dimensional Computational Fluid Dynamic Simulations of Blood Flow in Arteries[1] DAVID JOHNSON, Graduate Student Dept. of Chemical Engr., ULHAS NAIK, Professor Dept. Biological Science, ANTONY BERIS, Professor Dept. of Chemical Engr. — In three-dimensional (3D) simulation of a component of the arterial network, we have the problem of properly specifying outlet conditions due to coupling with the rest of the arterial network. In this work we propose to use an approximate solution, based on a one-dimensional (in space) but time periodic approximation of the flow, in order to obtain these outlet conditions. These are used in fully 3D and time periodic computational fluid dynamic (CFD) simulations of a coronary arterial junction, using the commercial software Fluent. A consistent implementation requires an iterative procedure that has been developed based on a lubrication approximation. The application of these boundary conditions has been applied to both a normal/healthy coronary artery junction and a diseased case, where an occlusion has developed causing impairment of flow. Results will be shown that demonstrate significant changes to the solution.

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David Johnson
Graduate Student

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