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Direct Numerical Simulations of transitional pulsatile flow through stenotic vessels[1] NIKOLAOS BERATLIS, ELIAS BALARAS, Dept. Mechanical Engineering, University of Maryland, College Park, MD 20742 — A series of direct numerical simulations of pulsatile flows in pipes with a constriction are presented here. Results capture the flow features reported in earlier experiments in the literature and confirm a qualitatively similar multi-step process to transition to turbulence observed in planar configurations. In particular, an instability of the shear layer leads to the formation of an array of vortices rings. Transition to turbulence takes place as these vortex rings undergo three-dimensional instabilities. We will present a systematic study of the effects of: 1. geometry of the constriction; 2. percent occlusion; 3. inflow conditions, to the above transition process. In addition, the effects of blood rheology on the results will be explored via numerical experiments with a variety of non-Newtonian models.

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Elias Balaras
Dept. Mechanical Engineering, University of Maryland,
College Park, MD 20742

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