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# Analysis of non-Newtonian effects within an aorta-iliac bifurcation region

Marcello Iasiello<sup>(a)</sup>, Kambiz Vafai<sup>(b),\*</sup>, Assunta Andreozzi<sup>(a)</sup> and Nicola Bianco<sup>(a)</sup>

(a) Dipartimento di Ingegneria Industriale, Università degli Studi di Napoli Federico II,  
P.le Tecchio, 80, Napoli 80125, Italy

(b) Department of Mechanical Engineering, University of California, Riverside, CA 92521, USA

**Abstract.** The geometry of the arteries at or near arterial bifurcation influences the blood flow field, which is an important factor affecting arteriogenesis. The blood can act sometimes as a non-Newtonian fluid. However, many studies have argued that for large and medium arteries, the blood flow can be considered to be Newtonian. In this work a comprehensive investigation of non-Newtonian effects on the blood fluid dynamic behavior in an aorta-iliac bifurcation is presented. The aorta-iliac geometry is reconstructed with references to the values reported in Shah et al. (1978); the 3D geometrical model consists of three filleted cylinders of different diameters. Governing equations with the appropriate boundary conditions are solved with a finite-element code. Different rheological models are used for the blood flow through the lumen and detailed comparisons are presented for the aorta-iliac bifurcation. Results are presented in terms of the velocity profiles in the bifurcation zone and Wall Shear Stress (WSS) for different sides of the bifurcation both for a male and female geometries, showing that the Newtonian fluid assumption can be made without any particular loss in terms of accuracy with respect to the other more complex rheological models.

**Keywords:** arterial bifurcation, arteriogenesis, non Newtonian, 3D geometrical model, Wall Shear Stress, aorta-iliac bifurcation

\*corresponding author: [vafai@engr.ucr.edu](mailto:vafai@engr.ucr.edu)

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