Blood-flow modelling along and trough a braided multi-layer metallic stent

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We study hemodynamics in a stented artery connected to a collateral artery. The blood flow is driven by the pressure drop. Our aim is to characterize the flow-rate and the pressure in the contiguous zone to the main artery: using boundary layer theory we construct a homogenized first order approximation with respect to ε, the size of the stent's wires. This provides an explicit expression of the velocity profile through and along the stent. The profile depends only on the input/output pressure data of the problem and some homogenized constant quantities: it is explicit. In the collateral artery this gives the flow-rate. The computation of homogenized constants relies in this framework on the resolution of Stokes' equations on unbounded periodic strips with obstacles. These are the minimal periodic structure of stent's wires. We provide numerical results on both micro and macro scales that illustrate and validate our theoretical results.

Références

[1] V. Milisic, Blood-flow modelling along and trough a braided multi-layer metallic stent submitted

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