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A dynamic-Immersed Boundary approach for blood-borne cells transport

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Here a numerical framework for computing the vascular journey of microsized particles is presented. The incompressible Navier–Stokes equation is modeled through an incompressible BGK-Lattice Boltzmann scheme. The discrete Boltzmann equation is endowed with a forcing term accounting for the presence of immersed geometries. Dirichlet boundary conditions are imposed on moving deformable or rigid geometries through a dynamic-Immersed Boundary method, while, on fixed immersed geometries a second-order bounce–back technique is adopted. The proposed computational framework is employed to detail transport, dynamic, and deformation of micrometric capsules into a microfluidic bifurcation. This journey is characterized in terms of: i) the capsule/bifurcation interaction depending on the sharpness of the bifurcation junction; ii) daughter branches aperture angle; iii) occlusion ratio, ratio between capsule size and main channel diameter; iv) flowing capsules stiffness; v) number of flowing particles.

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