

The Navier–Stokes equations in thin tube structure motivated by hemodynamics

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The time-periodic Navier-Stokes equations are considered in thin tube structures in three and two-dimensional settings with Dirichlet boundary conditions. A thin tube structure is defined as finite union of thin cylinders which are characterized by a small parameter ε which is the ratio of the height and the diameter of the cylinders. We consider the case of the finite or big coefficient before the time derivative. This setting is motivated by hemodynamic (small vessels). Theorems of existence and uniqueness of a solution are proved. Complete asymptotic expansion of a solution is constructed and justified. The method of asymptotic partial decomposition of the domain is justified for the time-periodic problem.

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