Application of Trefftz method for viscous laminar flow in tubes corrugated longitudinally or transversally

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This paper examines the viscous laminar flow in axisymmetric pipes corrugated longitudinally or transversally by means of Trefftz method. This type of flow occurs for example in case of vascular stenosis. In case of transversally corrugated pipes the problem is governed by Poisson equation with longitudinal velocity as unknown (Poiseuille flow). Linear boundary value problem is solved via Trefftz method using special purpose T-functions. In case of longitudinally corrugated channel the problem is governed by Navier-Stokes equations with unknown stream function. This nonlinear equation is solved via Picard iteration method. On each iteration steps the method of fundamental solutions (Trefftz method with F-functions) and method of particular solutions is used for solution of nonhomegenous equation. Radial basis functions were used for interpolation of nonhomogenous term of the equation.

Keywords: corrugated tubes, Poiseuille flow, Navier-Stokes equations, Trefftz method, method of fundamental solutions, method of particular solutions