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Computational Investigation of the Retropulsive Jet Produced by Antral Contraction Waves in a Model Stomach KATHLEEN FEIGL, Michigan Technological University, SAMER ALOKAILY, University of Petra, FRANZ TANNER, Michigan Technological University — Numerical simulations are performed to investigate the retropulsive jet that is produced by peristaltic motion during the mixing and digestion process in a model human stomach. The geometrical model for the stomach consists of an axisymmetric conical-shaped tube with a wall at one end which represents the antrum and closed pylorus. The antral contraction waves which produce the peristaltic flow, and consequently the retropulsive jet near the closed pylorus, are modeled as traveling waves along the tube boundary which deform the computational mesh. This geometrical model and the boundary deformation algorithm are implemented into a C++ library and then coupled with the open source code OpenFOAM. The effect of various parameters on the retropulsive jet near the pylorus is investigated. These parameters include the fluid viscosity, wave speed, wave width and maximum relative occlusion. The retropulsive jet is quantified by its peak velocity and jet length along the centerline at maximum relative occlusion. For each wave geometry, it is found that the velocity and pressure curves scale with wave speed at low Reynolds numbers. Between different wave geometries, scaling laws are proposed and tested for the peak centerline velocity and jet length at low Reynolds numbers.

Kathleen Feigl
Michigan Technological University

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