

## **Application of the homotopy analysis method and the method of fundamental solutions for peristaltic flow in three-dimensional case**

**\*J.K. Grabski<sup>1</sup>, and J.A. Kołodziej<sup>1</sup>**

<sup>1</sup>Institute of Applied Mechanics, Poznan University of Technology, ul. Jana Pawla II 24, 60-965 Poznan, Poland.

\*Corresponding author: jakub.grabski@doctorate.put.poznan.pl

Peristaltic flow is mainly associated with functioning of the small intestine but peristaltic pumps are also used in industry and medicine. So far in the literature the perturbation method, the finite difference method and the finite element method were used in order to solve the governing equation of the peristaltic flow problem in three-dimensional case. The governing equations of the problem is Navier-Stokes equations with stream function as unknown. In the paper we proposed to solve the equations using the homotopy analysis method. In the method the approximate solution is a finite expansion in Taylor series. The homogenous part of the solution is obtained using the method of fundamental solutions. In order to interpolate the non-homogenous term radial basis functions are used. The accuracy of the solution is controlled by the number of elements of the Taylor series.

**Keywords:** peristaltic flow, Navier-Stokes equations, homotopy analysis method, method of fundamental solutions, radial basis function