# Numerical Investigation of Swirl Flow in Curved Tube with Various Curvature Ratio

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## Abstract

Use of COMSOL Multiphysics®
The influences of curvature effects and swirl intensities for Non-Newtonian viscous fluid flow in a curved tube have been numerically investigated by using COMSOL Multiphysics®. The twisted tape, which are located directly in front of the curved part, are used as swirl flow generators. The tape is twisted until it reaches an angle of 90 degrees and turns right (Figure 1). The mathematical model is developed taking into account a negligibly small gravity force. The steady three-dimensional Navier-Stokes equations are used as the governing equations.
Boundary conditions: in the inlet region of the channel velocity field is fully developed, in the outlet region of the channel normal stress is given (the total stress on the boundary is set equal to a stress vector of magnitude, f0=0, oriented in the opposite normal direction). The no-slip condition is forced on the channel walls.
To describe the viscosity behavior is taken the Kutateladze model, which based on the structural theory of viscosity and its parameters have physical meaning.

Conclusion
As a result of the numerical investigation were received mutual influence of the degree of swirl flow and radius of curvature of the channel on the hydrodynamic flow pattern of pseudoplastic fluid in a curved channel.

# Figures used in the abstract

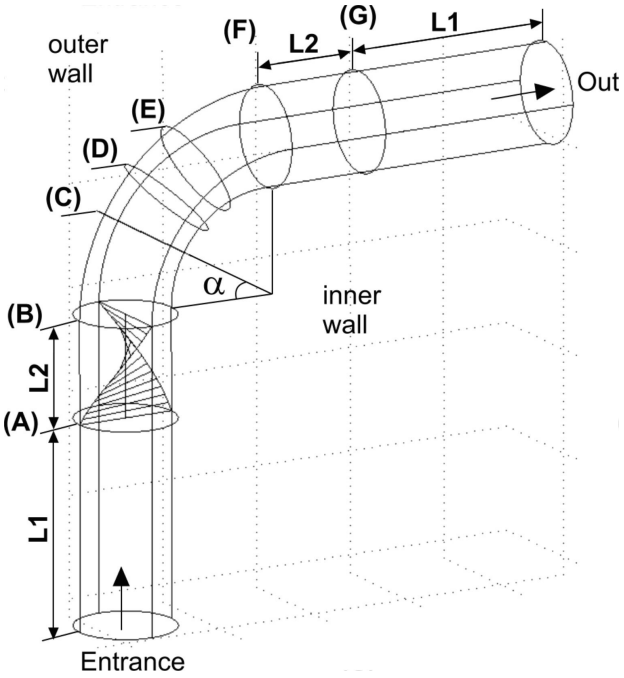


**Figure 1**