

# Rotationally Invariant and Partially Invariant Flows of a Viscous Incompressible Fluid and a Viscous Gas

A.HEMATULIN and S.V.MELESHKO

*School of Mathematics, Institute of Science, Suranaree University of Technology, Nakhon Ratchasima, 30000, Thailand*

**Abstract.** In this manuscript we study the Navier-Stokes equations and viscous gas dynamics equations. These equations play a central role in much of the research within applied mathematics, physics and engineering. One of the questions that we study here is the existence of solutions of special vortex type for the Navier-Stokes equations and viscous gas dynamics equations. This type of solution for the inviscid gas and fluid dynamics equations was introduced by L.V.Ovsiannikov [1]. Note that this solution is partially invariant with respect to group of rotations  $O(3)$ . Another part of our study is devoted to the group classification of spherically symmetric viscous gas dynamics equations. The approach used is classical group analysis. We use the notions of invariant and partially invariant solutions.

**Key words:** Invariant and partially invariant solutions, group classification, Navier-Stokes and viscous gas equations.

<sup>1</sup>A historical review of a group analysis development can be found in [2]. Many results of the group analysis are collected in [3]