Applications of Qualitative Theory of Ordinary Differential Equations in Fluid Dynamics

A Thesis Submitted in Partial Fulfillment of the Requirements of the Master’s Degree in Mathematics

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ABSTRACT

APPLICATIONS OF QUALITATIVE THEORY
OF ORDINARY DIFFERENTIAL EQUATIONS
IN FLUID DYNAMICS

In the present thesis the qualitative theory of differential equations is used along with topological considerations to discuss problems in fluid dynamics. Special attention is given to the qualitative aspects of dynamics of bubble in a viscous incompressible liquid, in particular to the collapsing of empty spherical bubble and oscillations of gas bubble. The theory relies much on the determining the critical radius of bubble, so that the bubble has a different behavior when its radius less than that critical value and when its greater that critical value.