



Centro de Ciências Exatas e da Natureza
Departamento de Matemática
Secretaria de Pós-Graduação

Colóquio do DMat

Boundary control of the motion of a heavy piston in viscous gas

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Resumo:

A mathematical model of compressible, non homogeneous Navier-Stokes equations with the free boundary is introduced for the purposes of optimal control. The state equation is a simplified model of the Stirling engine. A one-dimensional free boundary problem of the motion of a heavy piston in a tube filled with viscous gas is considered. The system of governing equations and boundary conditions is derived. The obtained system of differential equations can be regarded as a mathematical model of an exterior combustion engine. The existence of an optimal control for problem of maximization of the useful work of the engine is shown. The method of the proof is constructive and can be exploited for numerical methods. The presented results are obtained in collaboration with P.I. Plotnikov from Novosibirsk in Russia.

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