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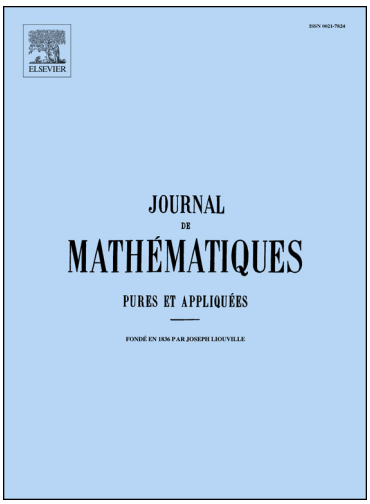

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Weak solutions to the full Navier-Stokes-Fourier system with slip boundary conditions in time dependent domains

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Abstract

We consider the compressible Navier-Stokes-Fourier system on time-dependent domains with prescribed motion of the boundary, supplemented with slip boundary conditions for the velocity. Assuming that the pressure can be decomposed into an elastic part and a thermal part, we prove global-in-time existence of weak solutions. Our approach is based on the penalization of the boundary behavior, viscosity, and the pressure in the weak formulation. Moreover, the thermal energy equation is in the weak formulation replaced by the thermal energy inequality complemented with the global total energy inequality. In the approximation scheme the thermal energy inequality is considered to be satisfied in the renormalized sense.

Keywords: compressible Navier-Stokes-Fourier equations, time-varying domain, slip boundary conditions
2010 MSC: 35Q35, 35D30, 76D05

Resume

Nous considerons le systèm de Navier - Stokes - Fourier compressible dans un domaine dépendant du temps avec un mouvement prescrit dela frontière, complété par une limite de glissement pour la vitesse. Nous montrons l'existence globale de solutions faibles.

1. Introduction

The flow of a compressible viscous heat conducting fluid is in the absence of external forces described by the following system of partial differential equations

$$\partial_t \varrho + \operatorname{div}_x(\varrho \mathbf{u}) = 0, \tag{1}$$

$$\partial_t(\varrho \mathbf{u}) + \operatorname{div}_x(\varrho \mathbf{u} \otimes \mathbf{u}) + \nabla_x p(\varrho, \vartheta) = \operatorname{div}_x \mathbb{S}(\nabla_x \mathbf{u}), \tag{2}$$

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