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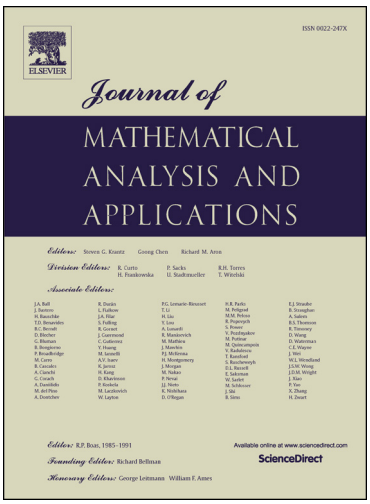

Asymptotic limit for rotational quantum compressible Navier–Stokes equations with multiple scales

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ASYMPTOTIC LIMIT FOR ROTATIONAL QUANTUM COMPRESSIBLE NAVIER-STOKES EQUATIONS WITH MULTIPLE SCALES

YOUNG-SAM KWON

Abstract. In this paper we consider the degenerate quantum compressible Navier-Stokes equations giving rise to a variety of mathematical problems in many areas. We study the asymptotic limit for the rotational compressible Navier-Stokes equations with quantum term and the ill-prepared initial data.

Contents

1. Introduction

The models of compressible Navier-Stokes equations arise in science and and a variety of engineering in many practical applications such as geophysics, astrophysics, and some engineering problems appearing in plasma confinement, liquid-metal cooling of nuclear reactors, and electromagnetic casting. We here consider the degenerate quantum compressible Navier-Stokes equations with damping om unbounded domain $\Omega = \mathbb{R}^2 \times \mathbb{T}^1$ where $\mathbb{T}^1$ is an one dimensional torus. The model consists of the mass conservation equation and a momentum balance equation, including a nonlinear third-order differential operator, with the quantum Bohm potential, and a density-dependent viscosity, it reads as:

$$\partial_t \varrho + \operatorname{div}(\varrho \mathbf{u}) = 0, \tag{1.1}$$

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Key words and phrases. Asymptotic incompressible limit, degenerate quantum compressible Navier-Stokes equations.

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