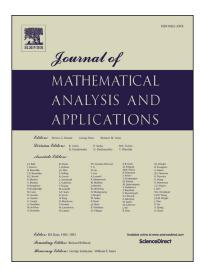
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Asymptotic limit for rotational quantum compressible Navier–Stokes equations with multiple scales

Young-Sam Kwon



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ACCEPTED MANUSCRIPT

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. Intro | luction | 1 |
|-----------|--|----|
| 2. Main | results | 3 |
| 3. Proof | of Theorem 2.2 | 5 |
| 3.1. Uni | form bounds | 5 |
| 3.2. Rela | ative entropy inequality | 6 |
| 3.3. Dis | persive Estimates | 7 |
| 3.4. Cor | vergence of viscosity and velocity terms | 8 |
| 3.5. Cor | vergence of pressure terms | 11 |
| 3.6. Cor | vergence of quantum potential terms | 14 |
| 3.7. Cor | vergence of initial data and conclusion | 14 |
| Reference | S | 15 |

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:

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

²⁰⁰⁰ Mathematics Subject Classification. Primary: 35L15; Secondary: 35L53.

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

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