Draft version August 11, 2016
Preprint typeset using LaTeX style AASTeX6 v. 1.0

HEAT TRANSPORT IN STRATIFIED CONVECTION ACROSS MACH NUMBER BLAHDY BLAH

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ABSTRACT

EVAN DON'T FORGET TO DO THIS

1. MOTIVATION

Blah Blah stuff.

2. MODEL & EQUATIONS

2.1. *The Fully Compressible Navier-Stokes Equations*

We solve over the Fully Compressible Navier-Stokes equations with an energy-conserving energy equation, which take the form:

$$\frac{\partial\rho}{\partial t} + \nabla\cdot(\rho\boldsymbol{u}) = 0 \tag{1}$$

$$\rho\left(\frac{\partial\boldsymbol{u}}{\partial t} + (\boldsymbol{u}\cdot\nabla)\,\boldsymbol{u}\right) = -\nabla P + \rho\boldsymbol{g} - \nabla\cdot\bar{\bar{\boldsymbol{\Pi}}} \tag{2}$$

$$\begin{split}\rho c_V\left(\frac{\partial T}{\partial t} + (\boldsymbol{u}\cdot\nabla)\,T + (\gamma-1)T\nabla\cdot(\boldsymbol{u})\right)\\ + \nabla\cdot(-\kappa\nabla T) = -\left(\bar{\bar{\boldsymbol{\Pi}}}\cdot\nabla\right)\cdot\boldsymbol{u}\end{split} \tag{3}$$

where the viscous stress tensor is defined such as

$$\Pi_{ij} \equiv -\mu\left(\frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i} - \frac{2}{3}\delta_{ij}\nabla\cdot(\boldsymbol{u})\right), \tag{4}$$

where μ is the *dynamic viscosity* (in units of [mass $\cdot$ length^{-1} $\cdot$ time^{-1}]) and δ_{ij} is the kronecker delta function. We also define the *kinematic viscosity*, which has units of a classic diffusion coefficient, as $\nu \equiv \mu/\rho$.

Taking the dot product of the velocity and the equation of momentum conservation (Eq. 2) and adding it to the energy equation

2.2. *Control Parameters*

REFERENCES