GLOBAL EXISTENCE VERSUS BLOW-UP RESULTS FOR ONE DIMENSIONAL COMPRESSIBLE NAVIER-STOKES EQUATIONS WITH MAXWELL'S LAW

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ABSTRACT. We consider one dimensional isentropic compressible Navier-Stokes equations with constitutive relation of Maxwell's law instead of Newtonion law. For this new model, we show that for small initial data, a unique smooth solution exists globally and converges to the equilibrium state as time goes to infinity. For some large data, in contrast to the situation for classical compressible Navier-Stokes equations, which admits global solutions, we show finite time blow up of solutions for the relaxed system. Moreover, we prove the compatibility of the two systems in the sense that, for vanishing relaxation parameters, the solutions to the relaxed system are shown to converge to the solutions of classical system. The high dimension case is also considered. This work is collaborated with Wang Na.