1135-35-3136 **Yanni Zeng*** (ynzeng@uab.edu). *L^p Asymptotic Behavior of Solutions to General Hyperbolic-Parabolic Systems of Balance Laws in Multi Space Dimensions.*

We study time asymptotic behavior of solutions for a general system of hyperbolic-parabolic balance laws in m space dimensions, $m \geq 2$. The system has physical viscosity matrices. Besides, there is a lower order term to account for relaxation, damping or chemical reaction. The viscosity matrices and the Jacobian matrix of the lower order term are rank deficient. We study Cauchy problem around a constant equilibrium state. Under a set of reasonable assumptions, existence of solution global in time is established, and L^p decay rates ($p \geq 2$) of the solution to the constant equilibrium state are obtained. We may further study the large time behavior of the solution. We show that it is time-asymptotically approximated by the solution of the corresponding linear system with the same initial data. For $p \geq 2$, optimal L^p convergence rates to the asymptotic solution are obtained. These rates are faster by $(t+1)^{-1/2}$ (or $(t+1)^{-1/2}\ln(t+2)$ if $m = 2$) when comparing to the convergence rates to the constant equilibrium state. Our results are general and apply to physical models such as gas flows with translational and vibrational non-equilibrium. The result on asymptotic behavior is new even for the special case of hyperbolic balance laws. (Received September 26, 2017)