UNIVERSITÀ DI PARMA

DIPARTIMENTO DI SCIENZE MATEMATICHE, FISICHE E INFORMATICHE

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SEMINARIO

Professor prof. Tommaso Ruggeri, Università di Bologna

Martedì 29 giugno 2021, **ore 16.00**

Sala Seminari, Plesso di Matematica

Extended Thermodynamics of Polyatomic Gases

Tutti gli interessati sono invitati a partecipare

Organizzatrice: Prof.ssa Marzia Bisi

Abstract: *In many physical systems one encounters situations where phenomena occur at different scales. An example is the modeling of a rarefied gas at varying Knudsen number (Kn). Large Kn is where Boltzmann equation is the most appropriate model while, for small Kn, one can obtain Euler or the Navier-Stojes-Fourier system. At intermediate regimes, using the mathematical methods of Rational Extended Thermodynamics (RET), one can obtain the closure of moments system associated with the Boltzmann equation considering a distribution function depending of an extra variable that take into account the internal motion of polyatomic gas (rotation and vibration). In this talk we consider a more refined version of Kinetic Theory and RET in which molecular rotational and vibrational relaxation processes are treated individually. In this case we need a triple hierarchy of the moment system and the system of balance equations is closed via the maximum entropy principle. Three different types of the production terms in the system, which are suggested by a*

generalized BGK-type collision term in the Boltzmann equation, are adopted. In particular, the rational extended thermodynamic theory with seven independent fields is analyzed in detail. Finally, the dispersion relation of ultrasonic wave is confirmed by the experimental data for several gases.