

# MATERIALS WITH MEMORY: FREE ENERGIES & SOLUTION EXPONENTIAL DECAY

SANDRA CARILLO

Dipartimento di Metodi e Modelli Matematici per le Scienze Applicate  
*Sapienza* University of Rome  
Via A. Scarpa 16, 00161 ROME, Italy

(Communicated by the associate editor name)

ABSTRACT. The model of a rigid linear heat conductor with memory is analyzed. Specifically, an evolution problem which describes the time evolution of the temperature distribution within a rigid heat conductor with memory is studied. The attention is focussed on the thermodynamical state of such a rigid heat conductor which, according to the adopted constitutive equations, depends on the history of the material. An integral term, due to the connection between the temperature's time derivative and the heat flux gradient, appears;

hence, the evolution problem is an integro-differential one. Then initial boundary conditions are assigned. Crucial in the present study are suitable expressions of the minimum free energy and of the thermal work, related to the other, which allow to construct functional spaces which are meaningful both under the physical as well as the analytic viewpoint. Indeed, on the basis of existence and uniqueness results previously obtained, exponential decay at infinity is proved.