

An Evolution Problem in Materials with Fading Memory: Solution 's Existence and Uniqueness

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Existence and uniqueness of the solution admitted by an evolution problem in the framework of heat conduction in materials with memory is here considered. Thus, a linear integro-differential equation with Volterra type kernel is investigated. In particular, an initial boundary value problem is studied; notably, the choice of a suitable function space, wherein solutions are looked for follows from physical properties of the material under investigation. Specifically, the weak formulation of the considered problem, via application of Fourier transforms, is related to an elliptic problem which is proved to admit a unique solution in a suitable Hilbert space. The latter, suggested by the adopted physical model, represents the space of admissible thermal histories; that is, the function space which comprises all those histories associated to a finite thermal work. On application of Plancharel's theorem combined with properties of Fourier Transform, referring to the original problem, the existence and uniqueness result is proved.

Keywords: Transform methods, Existence of solutions, Uniqueness of solutions Thermodynamics of materials with memory

AMS Subject Classification: (35A22, 45D05, 45A05, 30E25, 74A99)