INSIGHT INTO INVERSE PROBLEMS IN TRANSIENT HEAT CONDUCTION USING GREEN'S FUNCTIONS

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Transient heat conduction provides many inverse problems. Some are determination of certain parameters such as thermal conductivity and volumetric heat capacity. We term these parameter estimation problems. In other cases functions are needed such as the heat fluxes at boundaries, the volumetric energy generation distributed in a body and the initial temperature distribution. These are called function estimation problems. Green's functions provide a framework for illustrating these problems in a general but comprehensive way. The subject of Green's functions for transient heat conduction is reviewed and applications are made to the parameter and function estimation problems. The discussion is mainly about problems that are usually termed "linear" because they are linear in terms of the independent variable, which is temperature; however, but the parameter estimation problems, although linear in the temperature, are usually nonlinear in terms of the parameters.