ICM 1998, Berlin, Aug. 18–27

Abstracts of Short Communications and Posters

Section:

10. Partial Differential Equations

1991 MS Classification: 35R30

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Inverse problems for determining weakly singular kernels in partial integrodifferential equations.

Determination of hereditary properties of thermal and dynamical processes in viscoelastic materials lead to inverse problems for identifying kernel functions in integrodifferential equations of parabolic and hyperbolic types. From the engineering point of view the cases of weakly singular kernels are of great importance.

For parabolic problems the case of singular kernels doesn't bring along additional difficulties and one can obtain solvability, existence and stability results under usual regularity assumptions on the data. The hyperbolic problems are more complicated. There are two possibilities: to restrict very much the data of the problems or to take into consideration physically relevant monotonicity properties of the kernels. Results for both approaches are presented.