

Year: 2009

Vol.: 75

Fasc.: 1-2

Title: The identifying problem related to linear functional operators with linear arguments

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In the work we consider a general linear functional operator $\mathcal{P}$ (see below) arising when studying different problems of analysis, geometry and even gas dynamics. The class of these operators includes such popular operators as Cauchy and Jensen operators, the quadratical operator and many others. Because of linearity $\mathcal{P}$, the homogeneous equation $\mathcal{P}F \approx 0$ plays a very special role. In particular, it relates to the description of approximate solutions of this equation, including different definitions of this notion. Some example of such description is provided by the well-known Hyers–Ulam theorem (by no means connected with any stability). In the present work we introduce the notion Identifying problem. The essence of this problem consists of searching some subspaces $\mathcal{K}$, $C_{\langle\tau\rangle}$ and submanifold Γ , guaranteeing the validity of a specific á priori estimate of the operator $\mathcal{P}$. In the presence of this estimate a description of approximate solutions to the equation $\mathcal{P}F \approx 0$ is derived automatically. In this work the described procedure: searching above-mentioned subspaces and manifold, proving the needed á priori estimate and, finally, describing the required approximate solutions is derived by using some sufficiently general class of functional equations.

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