



Multiple Well-Posedness of Higher-Order Abstract Cauchy Problem

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Abstract: In this paper, we fulfill some conditions to examine the multiple well-posedness conditions that define the continuous dependence of the solutions and their derivatives on the initial data of the Cauchy problem. Indeed, for the differential operator equation of arbitrary order in a Hilbert space, an appropriate condition is given for the two main operators that assert the multiple well-posedness. Our results are new and complement some previous ones in the literature.

Keywords: *abstract Cauchy problems; asymptotic stability; integrated semi-groups; stability of nonlinear problems in mechanics; well-posedness.*

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1 Introduction

In [21], Vlasenko *et al.* studied the p -fold well-posedness of the higher-order abstract Cauchy problem of the following form:

$$\sum_{j=0}^n A_j \frac{d^j u}{dt^j} = 0, \quad t > 0, \quad (1)$$

$$u^j(0) = u_j, \quad j = 0, \dots, n-1, \quad (2)$$

where A_j ($j = 0, \dots, n$) are linear closed operators from a complex Banach space \mathcal{E} into

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