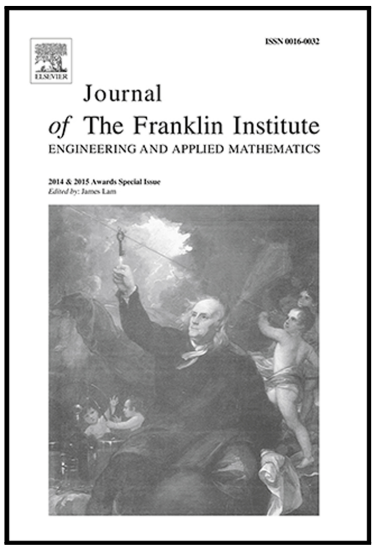

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Modification of Mikhailov stability criterion for fractional commensurate order systems

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Abstract

In this paper we present the modification of the Mikhailov stability criterion for linear fractional commensurate order systems. The modification consists in determining the appropriate measure for the total argument change depending on the highest fractional order $\alpha_n = n\alpha$ of the system and not only on the integer n as stated in the literature. The validity of the result is illustrated by means of several examples.

Keywords: Fractional commensurate systems, stability, Mikhailov criterion

1. Introduction and problem formulation

The use of fractional calculus for modelling physical systems has attracted increasing attention in last decades [1, 2, 3]. In particular, the application of fractional calculus in control theory has recently become an active area, see, for instance, [4, 5, 6, 7, 8], where one of the most fundamental problems is the stability analysis of fractional order systems, [9, 10, 11, 12, 13, 14, 15]. It is a well-known result, firstly proved by Matignon [10] and then generalized by Bonnet and Partington [11], that a linear fractional order system is asymptotically stable if and only if all the roots of the characteristic pseudo-polynomial associated to the system lie in the open left half of the complex plane. However, the application of such a result demands to determine the roots distribution of pseudo-polynomials which, in the general case, is a difficult task. Therefore, it is desirable to have some methods of determining

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