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Parameters and Order Identification of the Fundamental Linear Fractional Systems of Commensurate Order

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Abstract : The identification of fractional order systems is a more difficult problem than the integer one because it requires not only the estimation of the model coefficients but also the determination of the fractional orders with the tedious numerical calculation of the fractional order derivatives. This paper addresses the time domain identification of the dynamical fundamental linear fractional system of commensurate order described by linear fractional order differential equation. The proposed identification technique is based on the recursive least squares algorithm applied to a linear regression equation using adjustable fractional order differentiator to estimate the model's parameters and the commensurate order at the same time. Illustrative examples are also presented to validate the usefulness of the proposed identification approach.

Keywords : Adjustable fractional order differentiator, Least squares method, Linear fractional differential equation, Recursive identification