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Solution of the State-Space Linear Fractional Order Systems

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Abstract : A useful representation of fractional order systems is the state space representation. For the linear fractional systems of commensurate order, the state space representation is defined as for regular integer state space representation with the state vector differentiated to a real order. This paper presents a solution to the state space linear fractional systems of commensurate order. The solution is obtained using a technique based on functions of square matrices and the Cayley-Hamilton Theorem. The solution is calculated in the form of a linear combination of suitable fundamental functions. The basic ideas and the derived formulations of the technique are presented. An example is also given to demonstrate the effectiveness of the presented analytical approach.