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Fractional-Linear Transformations of Operator Balls Applications to Dynamical Systems

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摘要
关键词　　Compactness　Convexity　Linear fractional relation　Operator ball　Krein space

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Abstract　The operator sets, which are the subject of this paper, have been studied in many papers where, under different restrictions on the generating operators, convexity, compactness in the weak operator topology, and nonemptiness were proved for sets of different classes under study. Then the results obtained were used in these papers to solve several applied problems. Namely, they played the key role in establishing the dichotomy of nonautonomous dynamical systems, with either continuous or discrete time. In the present paper, we generalize and sharpen the already known criteria and obtain several new criteria for convexity, compactness, and nonemptiness of several special operator sets. Then, using the assertions obtained, we construct examples of sets of the form under study which are nonconvex, noncompact in the weak operator topology, as well as empty, and are generated by ``smooth'' operators of a special class. The existence problem for such sets remained open until the authors of this paper announced some of its results.

Key words　Compactness　Convexity　Linear fractional relation　Operator ball　Krein space

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