TRUDY INSTITUTA MATEMATIKI I MEKHANIKI UrO RAN

Vol. 23 No. 1 **2017**

DOI: 10.21538/0134-4889-2017-23-1-306-311

MSC: 93C55, 93D15

STABILIZATION OF DISCRETE TIME SYSTEMS BY REFLECTION COEFFICIENTS

Received September 31, 2016

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For single-input single-output discrete-time systems, we consider a stabilization problem by a fixed order controller. A number of examples show that such controller may not exist. It is assumed that the controller depends linearly on a stabilizing parameter. In this case, the stabilizing controller defines an affine subset in the parameter space. We use the well-known property of the Schur stability region in the parameter space. According to this property the closed convex hull of this region is a polytope with known vertices. Every stable vector has a preimage in the open cube $(-1, 1)^n$, and this preimage is called the reflection coefficient of this stable polynomial. By using reflection coefficients and polytopic properties of the stability region we obtain the stabilizability condition. This condition is expressed in terms of vertices of the stability region which is a multilinear image of the cube of reflection coefficients.

Keywords: discrete system, stability, affine stabilizer, reflection coefficient.

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Cite this article as:
T. Büyükköroğlu, G. Çelebi, V. Dzhafarov, Stabilization of discrete time systems by reflection coefficients, *Trudy Inst. Mat. Mekh. UrO RAN*, 2017, vol. 23, no. 1, pp. 306–311 .