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THE GEOMETRY OF CONVEX CONES ASSOCIATED WITH THE LYAPUNOV INEQUALITY AND THE COMMON LYAPUNOV FUNCTION PROBLEM*

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Abstract. In this paper, the structure of several convex cones that arise in the study of Lyapunov functions is investigated. In particular, the cones associated with quadratic Lyapunov functions for both linear and non-linear systems are considered, as well as cones that arise in connection with diagonal and linear copositive Lyapunov functions for positive linear systems. In each of these cases, some technical results are presented on the structure of individual cones and it is shown how these insights can lead to new results on the problem of common Lyapunov function existence.

Key words. Lyapunov functions and stability, Convex cones, Matrix equations.

AMS subject classifications. 37B25, 47L07, 39B42.

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