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ESTIMATION OF THE ADEQUACY OF CONDITIONS FOR THE DEVELOPMENT OF ROCKETRY HARDWARE AS COMPLEX SYSTEMS USING THE THEORY OF STATISTICAL SIMILARITY

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One of the most important problems in the experimental development of rocketry hardware is to determine the degree of adequacy of conditions for the development of space rocket (SR) systems and SR-type complex systems. The aim of this paper is to develop a methodological approach to the determination of the above conditions. This approach includes the theory of statistical similarity of SR systems at comparison stages, the principal components method, the normal distribution law for random values of system parameters measured during tests, a geometrical interpretation of partial correlation and regression, and dispersion ellipsoids. Based on the proposed methodological approach, a criterion is determined in the form of a relation between the dispersion ellipsoids that characterize tests (ground ones and full-scale ones) with account for their positional relationship at comparison stages. The proposed approach has made it possible to obtain an expression for the point value of statistical similarity criterion which reduces the extent of testing for SR-type complex systems, refines the reliability indices, and allows one to optimize the SR development cost.

Keywords: *statistical criterion, dispersion ellipsoid, principal components method, space rocket.*

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