A SIMPLE, CORRECT PEDAGOGICAL PRESENTATION OF AIRPLANE LATERAL-DIRECTIONAL DYNAMICS

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Abstract

This paper offers a clean and correct pedagogical presentation of the theory of airplane lateral-directional dynamics. In this work, the definition of the dynamic (rate) derivatives has been corrected, distinct timescales corresponding to the standard lateral-directional modes have been identified, and a multiple timescale procedure including static residuals has been followed to derive new literal approximations to the modes. The lateral-directional small-perturbation equations have themselves been written without having to first derive the complete6-degree of freedom equations of airplane motion. New, physically meaningful results for the Dutch roll and spiral mode parameters are obtained and discussed. This work complements the revised presentation of airplane longitudinal dynamics in a companion paper.

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