Modeling of a Stewart Platform for Analyzing One Directional Dynamics for Spacecraft Docking Operations

Authors : Leonardo Herrera, Shield B. Lin, Stephen J. Montgomery-Smith, Ziraguen O. Williams

Abstract : A one-directional dynamic model of a Stewart Platform was developed to assist NASA in analyzing the dynamic response in spacecraft docking operations. A simplified mechanical drawing was created, capturing the physical structure's main features. A simplified schematic diagram was developed into a lumped mass model from the mechanical drawing. Three differential equations were derived according to the schematic diagram. A Simulink diagram was created using MATLAB to represent the three equations. System parameters, including spring constants and masses, are derived in detail from the physical system. The model can be used for further analysis via computer simulation in predicting dynamic response in its main docking direction, i.e., up-and-down motion.
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