

SELECTED TOPICS In Aerospace Engineering

EDITOR

ERWIN SULAEMAN



IIUM Press

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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*OVERVIEW OF DYNAMICS OF
FLEXIBLE AIR VEHICLE*

11.1 Introduction

This chapter describes overview of dynamics of air vehicle with additional considerations on the flexibility of the vehicle structure. The consideration on the structural flexibility is important on the vehicle design due to escalating demand on optimizing the vehicle performance by increasing the vehicle speed and in the same time decreasing structural stiffness to reduce the weight. These two optimization efforts will lead to a higher structural deformation which, at one point, induces additional loading that should be properly taken into account.

The focus of the following 17 chapters is to investigate the effect of the structural flexibility on the air vehicle stability and response, with the emphasis on the structural stiffness formulation, aerodynamic load induced by structural deformation, and interaction between aerodynamic load and structural dynamic force that leads to instability problem.

11.2 Influence of Structural Flexibility on Vehicle Design

It has been known that, after passing some conditions, structural flexibility may induce a profound effect on the local or global design of the vehicle structure. It may change support placement, mass distribution, element sizing, or even system mechanism design. Several aspects that can be affected are noted in the following.