World Academy of Science, Engineering and Technology
International Journal of Aerospace and Mechanical Engineering
Vol:13, No:05, 2019

Numerical Study of Dynamic Buckling of Fiber Metal Laminates's Profile

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Abstract : The design of Fiber Metal Laminates - combining thin aluminum sheets and prepreg layers, allows creating a hybrid structure with high strength to weight ratio. This feature makes FMLs very attractive for aerospace industry, where thin-walled structures are commonly used. Nevertheless, those structures are prone to buckling phenomenon. Buckling could occur also under static load as well as dynamic pulse loads. In this paper, the problem of dynamic buckling of open cross-section FML profiles under axial dynamic compression in the form of pulse load of finite duration is investigated. In the numerical model, material properties of FML constituents were assumed as nonlinear elastic-plastic aluminum and linear-elastic glass-fiber-reinforced composite. The influence of pulse shape was investigated. Sinusoidal and rectangular pulse loads of finite duration were compared in two ways, i.e. with respect to magnitude and force pulse. The dynamic critical buckling load was determined based on Budiansky-Hutchinson, Ari Gur, and Simonetta dynamic buckling criteria.

Keywords : dynamic buckling, dynamic stability, Fiber Metal Laminate, Finite Element Method
Conference Title : ICAM 2019 : International Conference on Applied Mechanics
Conference Location : Amsterdam, Netherlands
Conference Dates : May 14-15, 2019