

Analysis of multi-layer composite simply Supported beam under blast loading

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ABSTRACT

In this study an attempt is made to derive governing equations satisfying equilibrium and compatibility, for multi-layer composite simply supported beam under blast loading , for linear material and shear connector behavior in which the slip (horizontal displacement) and uplift force (vertical displacement) are taken into consideration. The analysis is based on an approach presented by Roberts, which takes into consideration horizontal and vertical displacements in interfaces. The model consists of a simply supported beam with three layers having a cross-sectional area ,different dimensions and material properties. The analysis led to a set of six differential equations containing derivatives of the fourth and third order. The blast loading was considered as a function of time. Explosions have different effects including blast, penetrations and fragmentation. The blast is the main effect which hits the structure in short duration. Multi –layer composite construction is the best type of constructions to resist the blast loading ; according to this , multi-layer composite construction is used for air-craft and marine industries. Analysis of composite beam under blast load , taking in consideration vertical and horizontal displacements, leads to six differential equations , the load is taken as a function of time.