P18 Parametric Study of an Explosive Driven Shock Tube Part I: Analytical and Experimental Analysis

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Abstract:

The study of blast effects on structures as well as the assessment of the dynamic behaviour of building materials asks for experimental tools. Real scale experiments have important logistic and security restrictions and ask for significant quantities of explosives in order to get the wanted pressure-impulse combinations. The size of real scale explosion analysis may be reduced by the exploitation of phenomena such as the confinement of the blast and the guidance of the blast wave towards the target, by means of a tubular set-up. The present paper explores the idea of using an explosive driven cylindrical shock tube in order to obtain selected combinations of peak pressures and impulses.

The paper first presents a dimensional analysis aiming to set up a model for the determination of the pressure and impulse as a result of an explosion at the entrance of the cylindrical tube. The models take into account several important parameters: the tube length and section, the explosive mass and the charge-entrance distance. The models give rise to results which are assembled in easy to use abaci, which permit to evaluate the sensitiveness of the model for the different parameters.

The analytical study is supported by a set of experiments, in order to validate the analytical models. The experimental and analytical results show good agreement and may serve for numerical model validation.

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