

CONSTITUTIVE MODELLING OF THE DYNAMIC BEHAVIOUR OF THE BUILDING STEELS FOR DESIGN OF PROTECTIVE STRUCTURES

Leopold Kruszka^{1(*)}, Wojciech Moćko² and Jacek Janiszewski¹

¹ Military University of Technology (MUT), Warsaw, Poland

² Motor Transport Institute (MTI), Warsaw, Poland

(*)Email: lkruszka@wat.edu.pl

ABSTRACT

Currently, the computer programs of CAD type are basic tool for designing of various protective structures under blast and impact loading. Application of the numerical calculations allows to substantially reduce amount of time required for the design stage of such projects. However, the proper use of computer aided designing technique requires input data for numerical software including elastic-plastic models of structural materials. This work deals with various constitutive models, i. e. empirical, semi-empirical and based on physical basis applied for the modelling of mechanical behaviour of selected grades structural Polish steels and presents here results of experimental and analytical analyses to describe dynamic elastic-plastic behaviours of tested materials including wide range of temperature. In order to calibrate the constitutive models, series of compression tests at wide range of strain rates, including static, quasi-static and dynamic investigations at lowered, room and elevated temperatures, were carried out using various testing stands: servo-hydraulic machine and split Hopkinson bar. The results were analyzed to determine influence of temperature and strain rate on visco-plastic response of tested steels, and show good correlation with experimental data.

Keywords: impact, steel, split Hopkinson pressure bar.