

**XVIII INTERNATIONAL CONFERENCE**

**CONFERENCE**

**MCM-2014**

**BOOK OF ABSTRACTS**

**MECHANICS  
OF COMPOSITE MATERIALS**

**JUNE 2 - 6, 2014  
RIGA, LATVIA**



**INSTITUTE OF POLYMER MECHANICS  
UNIVERSITY OF LATVIA**

**EIGHTEENTH INTERNATIONAL CONFERENCE  
MECHANICS OF COMPOSITE MATERIALS**

**Devoted to the 50 Anniversary of the Institute of Polymer Mechanics  
University of Latvia**

**June 2 – 6, 2014  
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**BOOK OF ABSTRACTS**

**Eds. V. Tamužs, K. Cīrule, and V. Kulakovs**

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- Institute of Polymer Mechanics

## SUPPORTING INSTITUTIONS

- Latvian Academy of Sciences
- Latvian Council of Science
- Latvian National Committee for Mechanics
- University of Latvia
- Riga Technical University
- Journal *Mechanics of Composite Materials*
- Scientific Enterprise *Lakomp*
- Centre Composite (*Latvia*)

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## A SIMPLIFIED MODEL OF LOW-VELOCITY IMPACT DAMAGE OF LAYERED COMPOSITE

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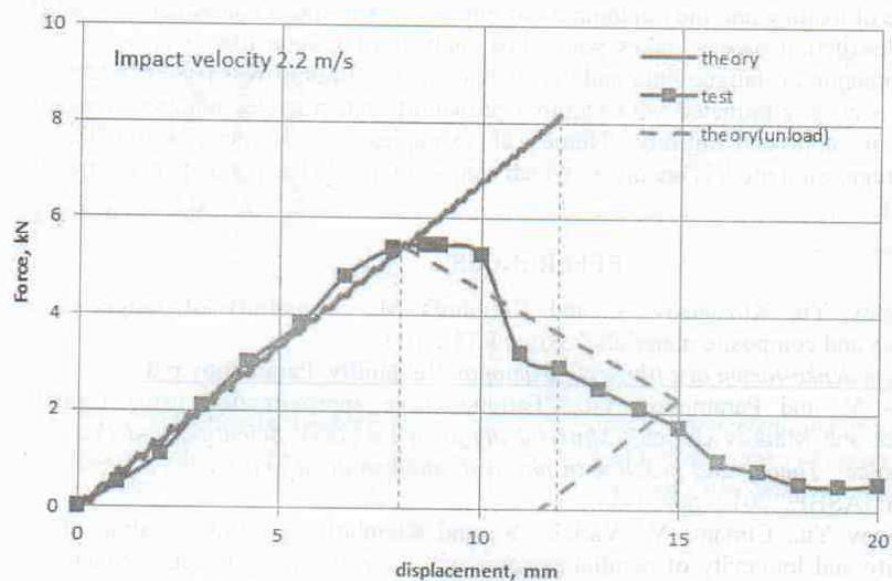
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The main efforts on the problem of predicting of layered composites impact damage are focused on the development of models of the progressive destruction using damage mechanics methods. However, with all the harmony and elegance of mathematical damage mechanics, there is no sufficient guarantee that the formal application of the general failure criteria of composites to local areas with large gradients of stress will always be adequate in practice.

On the other hand, the simpler and more reliable approaches of evaluation of impact damage are desirable for engineering applications. Therefore, one of these simplified models is proposed here for a layered composite impacted by a hard body. The model is based on the energy balance and the two-parameter simplified description of the descending branch of the loading process. Its development was done on a comparison with the results of impact test of the GFRP round plate (diameter 76.2 mm), 2 mm thickness and fixed edge [1].

Low velocity impact with energy in range 20–50 J was performed by hemi-spherical (20mm diameter) impactor.



The developed model is insensitive to the damage occurring on the ascending branch of the loading process, but gives reasonable estimates of the final damage.

### REFERENCES

1. Belingardi G. and Vadori R. , "Low velocity impact tests of laminate glass-fiber-epoxy matrix composite material plates," *Int. J. of Impact Engineering* 27 (2002) 213–229.