

**XVII INTERNATIONAL CONFERENCE**

**CONFERENCE**

**MCM 2012**

**BOOK OF ABSTRACTS**

**MECHANICS  
OF COMPOSITE MATERIALS**

**MAY 28 - JUNE 1, 2012**

**RIGA, LATVIA**

IMPACT OF COMPOSITE COMPONENT OF AIRCRAFT AND ITS DAMAGE

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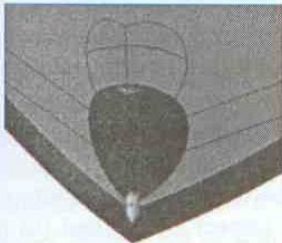


Fig. 1. The low-velocity impact of the CFRC thin rectangular plate by 8 mm granite sphere (the 1/4 part of both body is shown).

The analysis of the features of direct impact of thin-walled composite component of aircraft was performed. Several types of impactors were considered in the respect of actual causes of impact damaging in the aircraft operation. More realistic results can be obtained by computational simulation of dynamic process of impact (Fig. 1). The effect of materials of contact pair, geometrical form of impactor, its mass and initial velocity as well as also structure of the thin-walled composite plate, material performance, boundary conditions and others parameter was investigated. Mainly the GFRC and CFRC laminates were selected in form either thin separate plate or sandwich structure. The velocity of impact was limited by 40 m/s. It can say the low-velocity impact was simulated. Typical result of simulation is shown in the Fig. 2. At the first stage of impact (before destruction of some component of composite) material was

assumed as linearly elastic, homogeny and anisotropic.

Several conditions of destruction start were used for different kind of partial damage of composite (delaminating, the rupture of fiber, cracking of a matrix). The features of impact in the respect of mass-velocity effect were investigated.

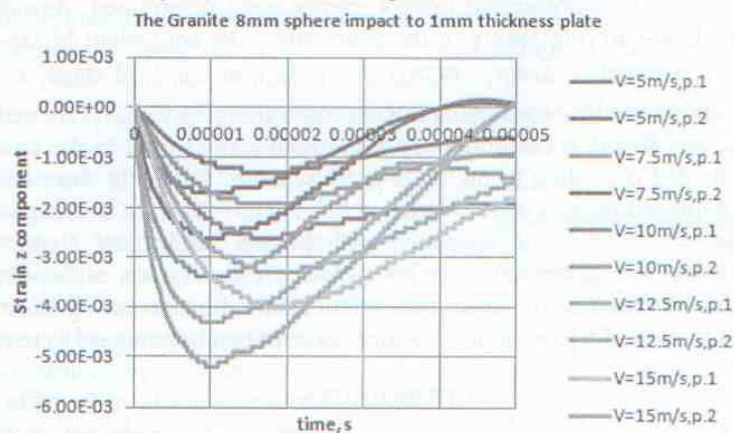


Fig. 2. Normal component of a strain in the point of contact (p.1) and in corresponded point of opposite surface (p.2) of a plate during first stage of impact.

**Acknowledgement.** The research leading to these results has received funding from the European Community's Seventh Framework Program [FP7/2007-2013] under grant agreement n°212912. The authors are grateful to European Commission for financial support and all partners for scientific and technological collaboration.