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Analysis of preloaded composite laminates subjected to impact Loads

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In this Ph.D. thesis the high velocity impact behaviour of plates with preload in the plane has been studied.

For the realization of this study, three composite materials were considered: a quasi-isotropic laminate of E-glass/vinylester, a quasi-isotropic laminate of carbon/epoxy (AS4/8552) and a woven laminate of E-glass/polyester.

By means of the modification of existent analytic models found in the literature, in this Ph.D thesis a simplified model was developed. This model considers the presence of a preload in the plane and allowed to estimate: the residual velocity, the contact time between the projectile and the laminate, the maximum force of contact and the contributions of the different energy mechanisms that play role in the impact phenomenon.

This model was contrasted with experimental results, evaluating: the residual speed, the ballistic limit and the projectile-laminate contact time.

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