

## Study of The Ballistic Impact at Low Speed on Angle-Ply Fibrous Structures

**Authors :** Daniel Barros, Carlos Mota, Raul Fanguero, Pedro Rosa, Gonçalo Domingos, Alfredo Passanha, Norberto Almeida

**Abstract :** The main aim of the work was to compare the ballistic performance of developed composites using different types of fiber woven fabrics [0,90] and different layers orientation (Angle-ply). The ballistic laminate composites were developed using E-glass, S-glass and aramid fabrics impregnated with thermosetting epoxy resin and using different layers orientation (0,0)<sup>o</sup> and (0,15)<sup>o</sup>. The idea of the study is to compare the ballistic performance of each laminate produced by studying the velocity loss of the fragment fired into the laminate surface. There are present some mechanical properties for laminates produced using the different types of fiber, where tensile, flexural and impact Charpy properties were studied. Overall, the angle-ply laminates produced using orientations of (0,15)<sup>o</sup>, despite the slight loss of mechanical properties compared to the (0,0)<sup>o</sup> orientation, presents better ballistic resistance and dissipation of energy, for lower ballistic impact velocities (under 290 m/s-1). After treatment of ballistic impact results, the S-Glass with (0,15)<sup>o</sup> laminate presents better ballistic performance compared to the other combinations studied.

**Keywords :** ballistic impact, angle-ply, ballistic composite, s-glass fiber, aramid fiber, fabric fiber, energy dissipation, mechanical performance

**Conference Title :** ICBBS 2021 : International Conference on Ballistics and Blast Studies

**Conference Location :** Amsterdam, Netherlands

**Conference Dates :** December 02-03, 2021