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Different method to make laminates by shear thickening fluid

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Abstract

One of the disadvantages of shear thickening fluid (STF) is high concentration. For better immersion of fibers, at first STF is diluted in ethanol, and then the fibers are left therein for a specified period in order to impregnate all fibers with the fluid. After this stage, to eliminate the ethanol in the sample, it is heated at a temperature range of 60–80°C. The composite's sensitivity to the impact will be reduced through ethanol

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combining with the fluid and its elimination. Furthermore, by means of vacuum infusion processing method, without use of ethanol (or reducing its portion) and heating, lighter composite could be obtained. The fluid is distributed to the required extent among the fibers and the additional fluid that causes weight increase is discharged through vacuum. In addition, the bubbles among the fibers and fluid are removed by vacuum. Specimens with 3 and 5 layers have been tested. By comparing the nanocomposites and neat specimens, experimental results show higher ballistic limit in all of the nanocomposite specimens. Results show that the ballistic limit is highest in the VIP method.

Keywords: dilution by ethanol; nanosilica; polyethylene glycol; shear thickening fluid (STF); vacuum infusion processing (VIP)

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