Effect of silica nanoparticles on the compressive behavior of RTM6 epoxy resin at different strain rates

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Abstract

RTM6 epoxy resin is considered the main matrix material for high performance aeronautical grade composites which can be subjected to impact loads. Research efforts have been spent to improve the strength and the overall impact properties of these resins. One of the routes followed focuses on the enhancement of the epoxy resin by the addition of rigid nanoparticles with different weight percentages and sizes.

The purpose of this work is to study the compressive behavior of RTM6 epoxy resin filled with silica nanoparticles at different strain rates. Two types of epoxy resins, namely neat epoxy resin and epoxy resin filled with silica nanoparticles at 0.1% weight percentage were tested. Quasi-static experiments were performed at strain rates of 0.008, 0.08, and 0.8 s^{-1}, while high strain rate experiments were performed at strain rates approx. 1000 s^{-1} using the split Hopkinson pressure bar technique. The behavior of both the nanoparticle filled resin and neat resin is compared and discussed. The effect of the silica nanoparticles on the compressive yield strength is also presented.

Keywords

high strain rate, split Hopkinson bar, epoxy resin, silica nanoparticles

Acknowledgement

The “EXTREME” project leading to this paper has received funding from the European Union’s Horizon 2020 research and innovation program under agreement No. 636549