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On the effect of autofrettage on compressive behavior of fiber metal composite cylinder

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Modern industries use fiber reinforced composite cylinders and tubes to store and transport fluids due to their non-corrosive nature and high specific strength. But, they are hygroscopic resulting in dimensional change when exposed to certain chemicals and gases. In this regard, alternate technologies such as hybrid composite cylinders, fiber reinforced metallic cylinders, autofrettaged metallic cylinders, etc. have been reported. But only few or none were based on the investigation of compressive strength of autofrettaged fiber reinforced metallic laminate (FML) cylinders. The objective of the work was investigating the effect of autofrettage on compression behavior of FML cylinders. The FML composites cylinders were fabricated by pultrusion process. Epoxy reinforced glass fiber polymer wound on aluminum metallic liner of 3 mm wall thickness at fiber orientation of 0°/90° and fiber reinforced polymer (FRP) thickness of 1 mm and 2 mm, were subjected to different levels (percentage) of autofrettage. Autofrettage was induced using a hydraulic pump test rig that could apply internal pressure up to a maximum of 200 MPa. FML cylinders and autofrettaged FML cylinders were subjected to radial compression in a computerized universal testing machine of maximum capacity 600 KN. The compressive strength and aspect ratio of all the cylinders were investigated. Experimental results show that autofrettaged FML cylinders increase compressive strength, with better energy absorption capacities than FML cylinders. Also, increasing the percentage of autofrettage enhances the compressive strength of the composite cylinder along with reduced deformation. From the investigation, it can be concluded that the compressive strength increase with increase in percentage of autofrettage and thickness of FRP.

Biography

Sumana B G has completed her Bachelor of Engineering in Mechanical Engineering from Malnad College of Engineering, Hassan and Master's in Machine Design from University Visveswaraya College of Engineering, Bangalore. She is currently pursuing her PhD from Bangalore University. Her research interests include fiber metal composites, fiber metal laminate cylindrical structures. She is a teaching faculty at Government Engineering College, Hassan, a premier technical institution in the state of Karnataka, India. She has published around 5 papers in reputed journals.

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