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M3Or4M-06: [Invited] Three-point bending experiment of epoxy resin and glass fiber reinforced composites by Fiber Bragg Gratings

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In this paper, real-time strain monitoring of epoxy resin and glass fiber reinforced composites was explored using embedded FBG from curing process to high temperature (413 K), cooling down to cryogenic temperature (4.2 K), and three-point bending experiment. The experimental data tested by FBG was compared with results got by strain gauges and extensometers. It was found that trend of strain response of sample obtained by FBG and strain gauge from curing process to high temperature and cryogenic temperature is the same. The maximum deviation between the strain value monitored by FBG in real time and the standard data is 5%, and the maximum deviation between the strain value monitored in real time by the strain gauge and the standard data is 15%. The measured value of the strain gauge is smaller than the standard data, indicating that the FBG has higher sensitivity and accuracy to the measurement of strain. FBG was successfully used to monitor room temperature flexural fracture failure of composites, and the elastic deformation of the material before flexural fracture. FBG can be used to monitor the flexural fracture failure of composite materials at liquid nitrogen temperature (77 K), and micro strain value (<100) of the material before flexural fracture.

Primary author: DONG, Hongyu

Co-authors: NISHIMURA, Arata (National Institute for Fusion Science); JIANG, Di

Presenter: JIANG, Di

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