

Characterization of Mechanical Properties of Graphene-Modified Epoxy Resin for Pipeline Repair

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Abstract : This experimental study consists of a characterization of epoxy grout where an amount of 2% of graphene nanoplatelets particles were added to commercial epoxy resin to evaluate their behavior regarding neat epoxy resin. Compressive tests, tensile tests and flexural tests were conducted to study the effect of graphene nanoplatelets on neat epoxy resin. By comparing graphene-based and neat epoxy grout, there is no significant increase of strength due to weak interface in the graphene nanoplatelets/epoxy composites. From this experiment, the tension and flexural strength of graphene-based epoxy grouts is slightly lower than ones of neat epoxy grout. Nevertheless, the addition of graphene has produced more consistent results according to a smaller standard deviation of strength. Furthermore, the graphene has also improved the ductility of the grout, hence reducing its brittle behaviour. This shows that the performance of graphene-based grout is reliably predictable and able to minimize sudden rupture. This is important since repair design of damaged pipeline is of deterministic nature.

Keywords : composite, epoxy resin, graphene nanoplatelets, pipeline

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