

# Mechanical Properties of Graphene Nanoplatelets-Reinforced Epoxy Grout in Repairing Damaged Pipelines

*Lim Kar Sing<sup>1,a</sup> , Libriati Zardasti<sup>2,b</sup> , Norhazilan Md Noor<sup>2,c</sup> and , Nordin Yahaya<sup>2,d</sup>*

1 Faculty of Civil Engineering and Earth Resources, Universiti Malaysia Pahang,  
Lebuhraya Tun Razak, Gambang, Kuantan, Pahang 26300, Malaysia.

2 Faculty of Civil Engineering, Universiti Teknologi Malaysia, UTM Skudai,  
Johor 81310, Malaysia.

a limks@ump.edu.my, b libriati@utm.my, c norhazilan@utm.my, d nordiny@utm.my

## **Abstract**

The use of Fibre Reinforced Polymer (FRP) composites together with infill grout has been proven effective for repairing damaged steel pipelines. This paper study the mechanical properties of epoxy grouts where an amount of 0.2% and 0.8% of graphene nanoplatelets particles were added to commercial epoxy resin to evaluate their behaviour regarding neat epoxy resin. Compressive tests, tensile tests and flexural tests were conducted to study the effect of graphene nanoplatelets towards neat epoxy resin. By comparing graphene-modified grouts and neat epoxy grout, there is no increment of strength under compression and tensile test due to poor dispersion of graphene nanoplatelets. Nevertheless, the addition of graphene has produced a noticeable improvement in flexural properties. This signifies that with the inclusion of graphene nanoplatelets, the properties of epoxy grout can be improved if a better dispersion can be achieved.

**Keywords** - *epoxy grout; graphene nanoplatelets; mechanical properties; pipeline repair*