

عنوان مقاله:

The effect of carbon nanotubes on buckling analysis of embedded oil pipes resting on elastic medium

محل انتشار:

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خلاصه مقاله:

The theoretical and experimental investigation on the thermo-mechanical properties of carbon nanotube (CNT) as reinforcer for oil and gas pipes has increasingly become a hot research area for many engineers and material scientists in recent years. This is mainly due to the advent of the new composite material systems that exhibit exotic material and mechanical properties as compared to the traditional, carbon fiber-reinforced composite structures. In this study, the effect of carbon nanotube (CNT) on the buckling of the embedded sea lines is investigated. The sea lines are simulated with isotropic cylindrical shell subjected to thermal and mechanical loads. The sea line is reinforced by armchair carbon nanotubes (CNTs) where characteristics of the equivalent nanocomposite being determined using Mori-Tanaka model. The elastic medium is modelled using Pasternak foundation. The governing equations are obtained based on strain-displacement, stress-strain and energy relations as well as Hamilton's principal. The influences of volume percent of CNTs in sea lines, geometrical parameters, elastic medium constants, temperature change and poison ratio on the buckling load of the system are investigated. Results indicate that the buckling load of the sea line increases with increasing volume percent of CNTs in sea lines. Hence, the CNTs are very useful as reinforcer for sea lines in order to increase of the buckling load of the system.

کلمات کلیدی:

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