

## **DYNAMIC RESPONSES OF SQUARE TLP'S TO RANDOM WAVE FORCES**

**ASHRAF M. ABOU-RAYAN & OSAMA S. HUSSEIN**

Department of Civil Engineering, Northern Border University, Arar, KSA

### **ABSTRACT**

Tension leg platform (TLP) is a suitable type for very deep-water oil production. The TLP is a compliant structure behaving like a floating one. This paper investigates the nonlinear response of the Square TLP configuration due to a random sea waves. Random waves were generated according to Pierson-Moskowitz spectrum and acts on the structure in the surge direction. The hydrodynamic forces evaluation is based on the modified Morison equation. Coupling effect and added mass are considered in the developing of the equation of motion. The nonlinear equation of motion is solved in the time domain utilizing the modified Euler scheme. Time history responses, phase planes, and Power spectrum densities (PSD) for the nonlinear responses are shown. Since only uni-directional waves in the surge direction was considered in the analysis, surge, heave and pitch degrees-of-freedom responses are influenced significantly.

**KEYWORDS:** Compliant Structures, Random Sea Wave Forces, Nonlinear Response