Numerical Analysis on Triceratops Restraining System: Failure Conditions of Tethers

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Abstract : Increase in the oil and gas exploration in ultra deep-water demands an adaptive structural form of the platform. Triceratops has superior motion characteristics compared to that of the Tension Leg Platform and Single Point Anchor Reservoir platforms, which is well established in the literature. Buoyant legs that support the deck are position-restrained to the sea bed using tethers with high axial pretension. Environmental forces that act on the platform induce dynamic tension variations in the tethers, causing the failure of tethers. The present study investigates the dynamic response behavior of the restraining system of the platform under the failure of a single tether of each buoyant leg in high sea states. Using the rain-flow counting algorithm and the Goodman diagram, fatigue damage caused to the tethers is estimated, and the fatigue life is predicted. Results shows that under failure conditions, the fatigue life of the remaining tethers is quite alarmingly low.