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Dynamic Arrest of Propagating Buckles in Offshore Pipelines

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Offshore pipelines are susceptible to local damage and collapse with the potential of propagation driven by the external pressure. Buckle propagation usually occurs at high velocities and can destroy large sections of the pipeline. An effective way to ensure that collapse, should it occur, affects only a small length of the pipeline, is the periodic placement of buckle arrestors along the line. These devices locally increase the circumferential bending rigidity of the pipe and thus provide an obstacle in the path of propagating buckles. The effectiveness of three different types of arrestors has been studied first under quasi-static and then under dynamic buckle propagation conditions using combinations of experiments and analyses. In all cases, inertial effects were found to enhance the arrestor performance; in other words, the pressure at which a given arrestor is crossed dynamically is higher than the quasi-static crossover pressure for reasons that will be outlined.

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