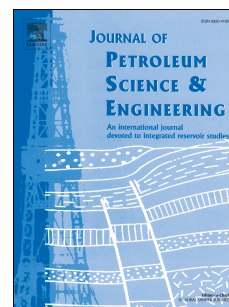


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# Combining Self-lift and Gas-lift: A New Approach to Slug Mitigation in Deepwater Pipeline-Riser Systems

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## ABSTRACT

Recent slugging studies have identified the need to develop new and optimal slug mitigation strategies as the key gap in slugging studies. This paper focused on combining the self-lift and gas-lift slug mitigation strategies for slugging mitigation in deepwater scenarios.

The Self-Lift Slug mitigation Strategy is a novel approach that involves tapping off gas via a by-pass pipe along the pipeline upstream of the riser. The gas is then re-introduced into the riser column via an injection point on the riser, to break the liquid slugs within the riser and mitigate severe slugging.

This research investigated the performance of the Self-Lift Strategy when adapted to a deepwater oil field case scenario via OLGA simulation. An alternative scenario of combining self-lift and gas lift was also investigated.

The approach for this study involved a robust methodology of firstly validating the field data by comparing pressure field data with OLGA simulation of the input data from the field. The field case consists of a 2712m pipeline section and a 1513m riser section. In this study, the severe slugging scenario was first run at the following flow conditions: well X1 was set up at 72.2°C temperature and mass flow of 3.25kg/s, well X2 was set up at 70.5°C and 12.13kg/s mass flow rate and the outlet section set up at 65.5°C and pressure 20 bara.

Self-lift was able to reduce holdup within the riser column, however pressure behaviour at the riser column was observed to be over 20 bara which is the design pressure for the inlets of the separator. Further studies involving a combination of Self-lift and gas lift at 8kg/s and 2 inches by-pass internal diameter, indicated that the pressure at the riser column was reduced to 20 bara, allowing for stable flow into the separator.

**Key Words:** Severe slugging, Self-lift, Gas-lift, Riser column, By-pass internal diameter

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