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1 Experimental Investigation On The Effect Of Diameter 2 Ratio On Two-Phase Slug Flow Separation In A T- 3 Junction

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14 Abstract

15 T-junctions are often used in offshore platforms to partially separate gas from produced
16 fluids. Poorly designed T-junctions frequently produce very high liquid (oil and/or water)
17 carryovers, causing major issues to the downstream equipment train which is not designed
18 to handle excessive liquid. This paper reports the liquid carryover experiments in T-
19 junctions using five different side to main arm diameter ratios under slug flow regime. The
20 obtained phase separation curves can be divided into two component variables; liquid-
21 carryover threshold and peak liquid carryover. The experiments demonstrate that with a
22 decrease in diameter ratio both of these variables decrease. Yet, for superior multiphase
23 flow separation, a high liquid carryover threshold and a low peak liquid carryover are
24 required. Hence, the generally accepted rule that a reduction in diameter ratio improves the
25 phase separation is revealed to be an over-extrapolated statement. The novel findings of this
26 work are: 1) for optimum flow splitting under slug flow conditions, the diameter ratio
27 should be kept between 1 and 0.67, while the diameter ratio 0.67 was found to be most
28 suitable; 2) two correlations were developed for predicting two-phase slug flow separation
29 in different diameter ratio T-junctions. These correlations offer beneficial guidance and
30 clarifications for a number of oil and gas flowline and pipeline applications.

31 **Keywords:** T-junction; slug flow; gas-liquid separation; diameter ratio.

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