Project background and objectives

Flow regimes (Figure 1) are intrinsically linked to flow characteristics and pressure profiles. The objectives of this review are as follows:

1. Collate existing experimental results
2. Review published experimental works
3. Validate previously developed models against a large data set
4. Develop a widely applicable prediction

Methodology

1. A total of forty sets of experimentally determined results (flow maps) consisting of 4185 individual data points was collated
2. The most abundant and relevant data set was then evaluated in further detail using well known models published by Taitel et al. 1980 [2]

Results

The model developed by Taitel et al. 1980 was successfully validated using the data set (Figure 2). A confidence interval of 10% was added to the model to account for minor inaccuracies.

Discussion and Conclusion

The non-dimensional solution was found to perform similarly to the standard plot when considering air-water flows (Table 1).

When applied to air-silicone flows the flow maps provided differing accuracies (Table 2).

Experimental results from non-air-water flows are limited and a conclusion cannot be drawn. Further investigation into this non-dimensional solution may be warranted.

References