

## PHASE INVERSION IN A DISPERSED OIL-WATER AND OIL-WATER-GAS FLOW

### PROJECT LEADERS

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### RESEARCH THEME

Complex dynamics of fluids

### PARTICIPANTS

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### COOPERATIONS

Shell Rijswijk

### FUNDED

FOM/SHELL

1<sup>st</sup> - 2<sup>nd</sup> 50% 3<sup>rd</sup> 50%

### START OF THE PROJECT

2004

### INFORMATION

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### PROJECT AIM

The aim of the study is to investigate the oil-water flow through a horizontal pipe. Special attention is paid to the pressure drop over the pipe during the inversion from oil-in-water to water-in-oil (or vice versa) and to the influence of injected gas on the inversion process.

### PROGRESS

An extended Ginzburg-Landau model for the description of the ambivalence region associated with the phenomenon of phase inversion was proposed. In analogy to the classical mean-field theory of phase transitions, it was shown that a good quantitative representation of the ambivalence region is obtained by using the injected phase volume fraction and the friction factor as the appropriate physical parameters. The project was finalized by writing publications and the doctoral thesis. Two publications will be published in 2009.

### DISSERTATIONS

1. K. Piela: Phase inversion in a dispersed oil-water and oil-water-gas flow. TU-Delft thesis, 29 September 2008.

### SCIENTIFIC PUBLICATIONS

1. K.Piela, R.Delfos, G.Ooms, J. Westerweel and R.V.A.Oliemans. On the phase inversion mechanism in an oil-water flow. *International Journal of Multiphase Flow* 34(7) 2008 665-677.
2. K.Piela, P. Poesio, G. Ooms and G.P Beretta, Interpretation of phase inversion in liquid-liquid flows by minimal dissipation approach, 5th International Conference on Transport Phenomena in Multiphase Systems, 30 June - 3 July 2008, Bialystok, Poland.