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Vakgroep: **Technische Stromingsleer**

In het kader van zijn doctoraalopdracht zal

Jaap de Jonge

een voordracht houden getiteld: **Modelling In Line Separation Process**

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Korte samenvatting:
In the oil industry there is a drive to achieve gas, oil and water separation in devices that are more compact than the traditional gravity based equipment. Traditionally, oil water separation takes place in vessels. The dispersion is separated under the influence of gravity. These vessels are large, heavy, maintenance intensive and need large oil platforms. New concepts in oil-water separation are in-line devices that use flow induced separation. These devices essentially utilize centrifugal force to separate the components of different densities as opposed to the traditional method of providing enough residence time to allow separation by gravity.
The Shell 'Facilities for the future' program is developing in-line separation. In order to qualify this technology, a number of systems have been tested in the Donau test facility. Although the test results showed promising results, further performance improvements can be achieved. The objective of the present study is to get a better understanding of the separation process in the swirling flow of an in-line separator and explore important parameters. With this knowledge a better understanding is obtained of the separation process.
The starting point is the study of models that are used to describe two-phase flow behavior in conventional gravity settlers. These models provide relations for droplet velocities and droplet coalescence. Subsequently these relations have been extended to swirling flow. In order to examine different azimuthal velocity profiles and different inlet conditions, an iteration scheme has been developed to simulate the separation process. Because the motion of oil droplets can show shock wave like behaviour, a special iteration method of Enquist and Osher is used for simulating the separation process.
Using the results of these simulations recommendations are formulated for the choice of the type of velocity profile that is best for efficient separation. Also different inlet conditions and different geometries have been considered. The influence of droplet break up is examined. Droplet break up due to shear stress has more influence on the separation process than higher g-forces. One of the main recommendations is to apply the highest amount of g-force without exposing the droplets to too much shear.

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