



ESDU-SPC-M11-1

Apr.09: Modeling of asphaltenes deposition and removal in crude-oil distillation units

**Unamended
Issued October 2010**

Modeling of Asphaltenes Deposition and Removal in Crude- oil Distillation Units

CROF Progress Meeting

21/22 April 2009 - Pembroke

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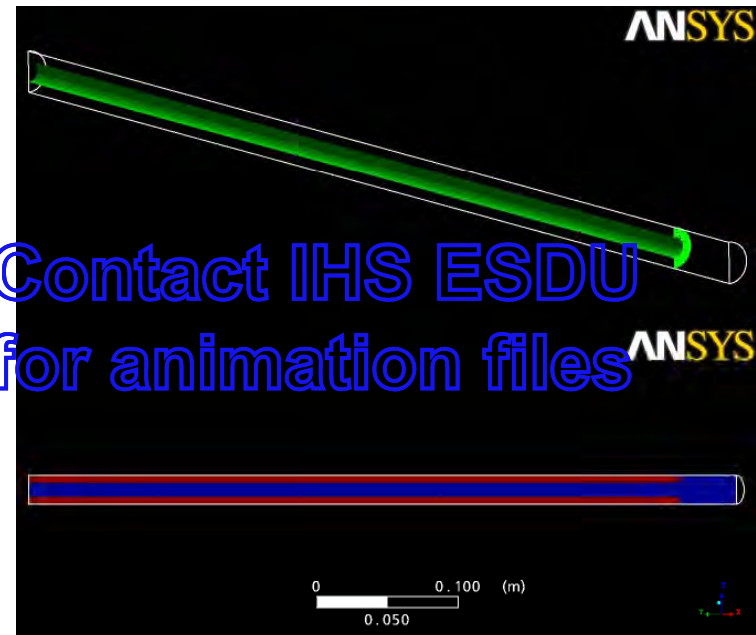
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INTRODUCTION

PROGRESS UP TO THE SEPTEMBER MEETING

- Laminar DNS simulations including Deposition and Aging.
- Preliminary turbulent simulations ($k-\varepsilon$) in a cylindrical geometry.



Contact IHS ESDU
for animation files

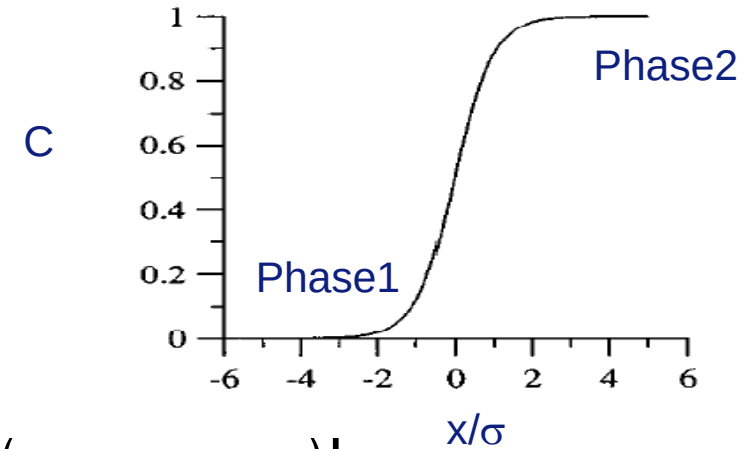
LES SIMULATIONS METHODS

Volume Of Fluids (VOF) – ANSYS CFX

$$\nabla \cdot \mathbf{u} = 0$$

$$\frac{\partial T}{\partial t} + \mathbf{u} \cdot \nabla T = \frac{1}{\text{Re Pr}} \nabla \cdot (\lambda \nabla T)$$

$$\rho \left(\frac{\partial \mathbf{u}}{\partial t} + \mathbf{u} \cdot \nabla \mathbf{u} \right) = -\nabla p + \frac{1}{\text{Re}} \nabla \cdot \left[\mu \left(\nabla \mathbf{u} + \nabla \mathbf{u}^T \right) \right] + f$$



VOF:

The colour function C (volume fraction) is transported by convection by the Velocity field. The interface is present in the cells where $0 < C < 1$ and reconstructed by a specific algorithm.

$$\frac{\partial C}{\partial t} + \mathbf{V} \cdot \nabla C = 0$$