



Upscaling: methods, pitfalls and consequences

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DGF – Oliegeologisk foredragsrække

As geological modelling develops an increasing ability to capture details in heterogeneity and therefore the flow properties, the demand for upscaling also increases. The growing disparity between the detailed models and the model-size limitations in full-field flow simulation can only be modified with appropriate upscaling techniques.

This presentation will first briefly present the geostatistical scaling laws that can be used within the geological modelling process itself, and secondly turn to the upscaling methods related to flow processes.

Flow upscaling procedures that can account for the geological heterogeneities will be presented for selected examples from both chalk reservoirs and from clastic reservoirs. Contrasts in permeability and other petrophysical properties will influence the distribution and flow of fluids that will cause anisotropy, cross-flow and break-through problems.

Upscaling of flow of only one fluid (or gas) phase seems fairly simple, but several different methods are available that are to be used depending on the geometry, scale and contrasts in the heterogeneity. Two- or three-phase upscaling will in addition depend on the saturation distribution.

One example will show that the permeability anisotropy in a layered reservoir chalk package can attain a value of 1:2 if single-phase upscaling is performed, while the anisotropy for the oil flow can increase to 1:5 if two fluid phases, oil and water, are present in the reservoir layers.

The presentation will be held in English. Non-DGF members are welcome.