

Efficient simulation of fluid flow in oil or gas reservoirs

Dr Steve Langdon

Summary

The more accurately fluid flow in a potential oil field can be assessed, the more efficiently and economically it can be developed, but the problem is an extremely complex one with many variables. Work undertaken at the University of Reading's Department of Mathematics and Statistics, working with Schlumberger PLC, developed a tool to provide fast, robust and efficient simulation of fluid flow in reservoirs.

Background

Simulation of fluid flow in oil or gas reservoirs is an essential tool in the management of hydrocarbon reserves. Schlumberger developed its current reservoir simulation software to offer robust and accurate reservoir simulations: dynamic models of oil and gas fields which allow the user to predict the effect of a change to well locations or production rates, for example. While reservoir simulators of this type will continue to play a crucial role in the industry, to use them takes considerable expertise and time.

There is thus a place for cruder approximation techniques; solution schemes that may have some limitations in their accuracy, or in the range of situations that they can model, but which can allow a reservoir or production engineer to perform a quick study of their reservoir in order to obtain a broad understanding of the dynamical processes and to make approximate costing forecasts.

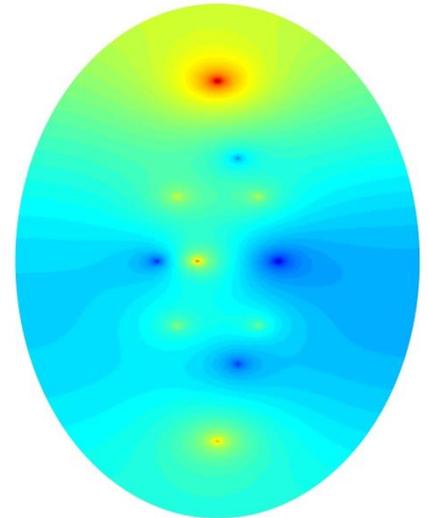
How is University of Reading research contributing?

A multifaceted approach, using expertise in modelling of fluid flow, asymptotic approximation, and computational mathematics was used to create two- and three-dimensional models and software which could provide reservoir simulation images in minutes rather than hours. This approach is particularly effective in the case that the depth scale of the reservoir is small compared to the horizontal length scale, a situation which occurs frequently in practice.

What impact has our research had?

Schlumberger have benefited from the development of software packages complementary to existing products, improving their competitive edge in a highly competitive market.

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