Kolloquium Angewandte Mathematik
Prof. Thomas Apel (BAU1)
Prof. Matthias Gerdts (LRT1)
Prof. Joachim Gwinner (LRT1)
Vertretungs-Prof. Sven-Joachim Kimmerle (BAU1)
Prof. Markus Klein (LRT1)

Universität der Bundeswehr München

Vortragsankündigung

Am **Dienstag, den 5.09.2017,** hält **um 17:00 Uhr**

Knut Sverdrup
(Cavendish Laboratory, U Cambridge)

einen Gastvortrag über das Thema

Numerical simulations of viscoplastic flow for wellbore cementing applications

Der Vortrag findet im **Raum 0401** in **Gebäude 33** statt.

Vortragszusammenfassung

When drilling an oil well, cement provides a barrier to unwanted hydrocarbon flow, isolates permeable zones in the foundation, and supports and protects the borehole casing. Many challenges exist when displacing cement into position, and numerical simulation is often used to predict flow patterns and fluid interfaces. Due to challenging well conditions and non-Newtonian (viscoplastic) rheological models used to describe the nature of the fluids, highly accurate numerical solutions are difficult to obtain in an efficient manner. This constitutes a significant challenge for ensuring safe and efficient analysis of a vital drilling operation.

We aim to address the aforementioned issues by building a new cementing simulation tool. In addition to revisiting the underlying mathematical formulation of the physical problem, the key challenges associated with the project are modelling of viscoplastic rheology; performing simulations in a low-speed flow regime; treatment of nontrivial, time-dependent geometries; capturing interfaces between displacing and displaced fluids accurately; and the achievement of fast run times through massive parallelisation and adaptive mesh refinement. The latter is necessary due to the disparate length and time scales of the problem at hand.

In this talk, I will introduce the problem at hand, before going into some more detail on the choice of computational methods employed. Specifically, I will elucidate how viscoplasticity can be treated using regularisation techniques; why the level-set algorithm is suitable for the fluid interfaces; and how we gained access to adaptive mesh refinement and state-of-the-art parallelisation on large clusters through the BoxLib/AMReX code libraries.

Alle Interessierten sind dazu herzlich eingeladen.