***An analysis of the Prothero–Robinson example for constructing new DIRK and ROW methods***

**Joachim Rang** (TU Braunschweig)

In this talk the order reduction phenomenon of diagonally implicit Runge-Kutta methods (DIRK–methods) and Rosenbrock–Wanner methods (ROW–methods) applied on the Prothero-Robinson example is analysed. New order conditions to avoid order reduction are derived and new DIRK and ROW–method are created.
The new schemes are applied on the Prothero–Robinson example and on the semi-discretised incompressible Navier–Stokes equations. Numerical examples show that the new methods converge with second order for velocity and pressure.