Meeting: 1003, Atlanta, Georgia, SS 5A, AMS Special Session on Radon Transform and Inverse Problems, I

1003-65-480 **Andreas Rieder*** (andreas.rieder@math.uni-karlsruhe.de), Institut fuer Praktische Mathematik, Universitaet Karlsruhe, 76744 Karlsruhe, Germany. *Runge-Kutta integrators yield optimal regularization schemes.* Preliminary report.

Asymptotic regularization (also called Showalter's method) is a theoretically appealing regularization scheme for an ill-posed problem $Tx = y$, T acting between Hilbert spaces. Here, $Tx = y$ is stably solved by evaluating the solution of the evolution equation $u'(t) = T^*(y - Tu(t)),\ u(0) = 0$, at a properly chosen finite time. For a numerical realization we have to apply an integrator to the ODE. We will show that all properties of asymptotic regularization carry over to its numerical realization: Runge-Kutta integrators yield optimal regularization schemes when stopped by the discrepancy principle. In this way a common analysis is obtained for so different regularization schemes as, for instance, the Landweber iteration and the iterated Tikhonov-Phillips method which are generated by the explicit and implicit Euler integrators, respectively. (Received September 16, 2004)