1048-65-155 **Anita T Layton*** (alayton@math.duke.edu), Department of Mathematics, Duke University, Box 90320, Durham, NC 27705. *Selectively Accelerated Semi-implicit Spectral Deferred Correction Methods.*

Spectral deferred correction (SDC) methods have been show to offer a flexible strategy for constructing numerical methods with very high order of accuracy for ordinary differential equations. Order reduction for SDC methods has been shown to coincide with a reduction in the rate at which the iterative solutions generated by SDC methods converge to the solution of the standard spectral collocation formulation. Hence the use of Krylov subspace based methods which accelerate the convergence of SDC methods also effectively eliminates order reduction. However, for very large systems of ODEs (such as those arising from the discretization of PDEs), the computational and storage costs of Krylov acceleration could be prohibitive. In this paper, we investigate the effectiveness of applying Krylov based accleration techniques only to the stiffest part of systems of ODEs which can be decomposed into terms of various stiffness. For many relevant examples, this can dramatically reduce the cost and storage requirement of applying accleration, while maintaining the advantage of improving convergence of the iterates or equivalently avoiding order reduction. Numerical examples demonstrate the effectiveness of this acceleration technique for problems with two and three distinctive time scales. (Received February 05, 2009)