1048-65-181 **Jingfang Huang*** (huang@amath.unc.edu), CB # 3250, Phillips Hall, Department of Mathematics, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599-3250, and **Quandong Feng**. *Krylov Deferred Correction Accelerated High Order Symplectic Methods.*

In this talk, an efficient numerical procedure is presented to implement the Gaussian Runge-Kutta (GRK) methods. The GRK technique first discretizes each marching step of the initial value problem using collocation formulations based on Gaussian quadrature which preserves the geometric structures of Hamiltonian systems. Existing analysis shows that the GRK discretization with s nodes is of order 2s, A-stable, B-stable, symplectic and symmetric, and hence "optimal" for solving initial value problems of general ordinary differential equations. However, as the unknowns at different collocation points are coupled in the discretized system, direct solution of the resulting algebraic equations is in general inefficient. Instead, we use the Krylov deferred correction (KDC) method in which the spectral deferred correction (SDC) scheme is applied as a preconditioner to decouple the original system, and the resulting preconditioned nonlinear system is solved efficiently using Newton-Krylov schemes such as Newton-GMRES method. The KDC accelerated GRK methods have been applied to several Hamiltonian systems and preliminary numerical results are presented to show the accuracy, stability, and efficiency features of these methods. (Received February 06, 2009)