1154-65-758 **Xucheng Meng**, **Thi-Thao-Phuong Hoang** and **Lili Ju*** (ju@math.sc.edu), Department of Mathematics, University of South Carolina, Columbia, SC 29208, and **Zhu Wang**. *Localized exponential time differencing methods for shallow water equations: algorithms and numerical investigations.* Preliminary report.

Exponential time differencing (ETD) has been proven to be very effective for solving stiff evolution problems in the past decades due to rapid development of matrix exponential algorithms and computing capacities. While direct parallelization of the ETD methods is rarely of good efficiency due to the required data communication, the localized exponential time differencing (LETD) approach was recently introduced for extreme-scale phase field simulations of coarsening dynamics, which displayed excellent scalability in modern supercomputers. The main idea is to use domain decomposition techniques to reduce the size of the problem, so that one instead only solves a group of smaller-sized subdomain problems simultaneously using the locally computed products of matrix exponentials and vectors. In this talk, we first propose and discuss overlapping LETD Runge-Kutta schemes for the rotating shallow water equations and their implementation algorithms. Numerical experiments are then presented to compare the performance of the LETD-RK schemes with the classic explicit RK time steppings to demonstrate the advantages of the proposed methods. (Received September 10, 2019)