1154-35-1591 **Hong Wang*** (hwang@math.sc.edu), Department of Mathematics, University of South Carolina, Columbia, SC 29208. *Variable-order fractional PDEs: modeling, computation and analysis.* Preliminary report.

Fractional partial differential equations (FPDEs) provide accurate descriptions of complex phenomena including anomalously diffusive transport, memory effect and long-range spatial interaction. However, existing FPDE models tend to introduce certain nonphysical singularity near the initial time and boundary of the domain. Consequently, numerical approximations to FPDEs, which were proved to converge under the artificially assumed full regularity of the true solutions that are in appropriate, often have compromised accuracy. The reason lies in the incompatibility between the nonlocality of the power law decaying tail of the solutions and the locality of the initial or boundary conditions.

We study a physically correct variable-order FPDE model with a variable order that varies smoothly near the initial time or boundary of the domain to account for the impact of the locality of the initial or boundary condition. In addition, variable-order FPDE models have already been applied in a variety of applications. We will discuss their numerical simulations, based on theoretically proven mathematical results as well as the identification of the parameters of the models. (Received September 16, 2019)