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**Mark M Meerschaert\*** ([mcubed@stt.msu.edu](mailto:mcubed@stt.msu.edu)), Department of Statistics and Probability,  
Michigan State University, East Lansing, MI 48824. *Fractional diffusion on bounded domains.*

Fractional derivatives were invented in the 17th century, soon after their integer order cousins. In the past decade, an explosion of practical applications has intensified interest in the subject. Fractional differential equations are now being used in cell biology, ecology, electronics, hydrology, and medical imaging to model anomalous diffusion, where a plume of particles spreads faster than the traditional integer-order diffusion equation predicts. There now exist a variety of effective numerical methods to solve fractional diffusion equations. However, the mathematically correct specification of a well-posed fractional diffusion on a bounded domain remains an open problem. The main issue is to write appropriate boundary conditions, or their fractional analogues. In this talk, we will discuss this open problem, and one possible approach using the newly developed theory of nonlocal diffusion. (Received January 08, 2015)