1086-60-1048 **Scott A Hottovy*** (shottovy@math.arizona.edu). *Smoluchowski-Kramers Approximation for Multidimensional systems.*

A small particle with diameter on the order of nano-meters to micrometers undergoes random motion when in a fluid. The motion is described by a stochastic Newton equation, using stochastic differential equations (SDE), relating acceleration with the forces acting on the particle. Experimentally, it is very difficult to measure the instantaneous velocity of the particle. Therefore, valid approximations to the SDE are useful for applications. One such approximation is the small mass, also called the Smoluchowski-Kramers, approximation. I will describe a new way to identify and prove this limit for systems of arbitrary dimension and give applications of this theorem to systems of experimental interest. (Received September 18, 2012)