## On the Significance of Higher Order Differential Terms in Diffusion Processes

The derivation of generalized linear diffusion equations with a discrete approach is presented. The motivation to derive the governing equations is population dynamics. Two types of problems are analyzed namely: symmetric spreading with temporary retention and propagation with temporary retention. Considering the case of population dynamics retention may be associated to colonization of the occupied territory. Retention in the context of this paper means always temporary retention diverging from permanent retention that could be modeled by a sink. Particularly interesting is the interpretation of third and fourth order terms associated to the contents retention in the redistribution process. It is clearly shown that higher order differential terms must be included in the governing equations of diffusion and propagation to represent the temporary retention effect. The transition from the discrete approach to the continuum approach requires de definition of new laws of mass transfer associated to three excitation states of the moving particles. A brief discussion about a new form of the Korteveg-deVries equation is presented.