1040-65-14 **Uri M Ascher*** (ascher@cs.ubc.ca), Dept. Computer Science, Univ. British Columbia, Vancouver, BC V6T1Z4, Canada. *Artificial time integration.*

Many recent algorithmic approaches involve the construction of a differential equation model for computational purposes, typically introducing an artificial time variable. The actual computational model involves a discretization, usually employing forward Euler. A discrete algorithm dynamics results, expected to approximate the dynamics of the continuous system (which is typically easier to analyze) provided that small - hence many - time steps, or iterations, are taken. This makes one wonder if and how the computational modeling process can be improved to better reflect the actual properties sought.

In this talk we elaborate on several problem instances that illustrate the above observations. Algorithms may often lend themselves to a dual interpretation, in terms of a simply discretized differential equation with artificial time and in terms of a simple optimization algorithm. Such a dual interpretation can be advantageous. Moreover, a discrete analysis may sometimes but not always be approximated by a continuous one for efficient algorithms. We show how a broader computational modeling approach may possibly lead to algorithms with improved efficiency. (Received December 14, 2007)