

Abstract for an Invited Paper
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Edward A. Bouchet Award Talk: NSFD Schemes: Genesis, Methodology and Applications¹

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Nonstandard finite difference (NSFD) schemes are based on a generalization of the usual discrete representations of first derivatives and the use of nonlocal discrete replacements for both linear and nonlinear functions of dependent variables. These numerical integration techniques for differential equations had their genesis in a 1989 publication.¹⁾ In the past decade much progress has occurred on the general methodology of these techniques and the range of phenomena to which these schemes have been applied.²⁾ This talk will give a broad introduction to NSFD schemes and show that the principle of dynamic consistency (DC)³⁾ can be used to place great restrictions on the constructions of such discretizations for both ODE's and PDE's. The essential features of the NSFD methodology will be illustrated by means of several "toy" models.⁴⁾

¹⁾R. E. Mickens, *Numerical Methods for PDE's*, **5** (1989), 313–325.

²⁾K. C. Patidar, *Journal of Difference Equations and Applications* **11** (2005), 735–758.

³⁾R. E. Mickens, *Journal of Difference Equations and Applications* **11** (2005), 645–653.

⁴⁾R. E. Mickens (editor), *Advances in the Applications of Nonstandard Finite Difference Schemes*. World Scientific, Singapore, 2006.

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