**Numerical Analysis of Evolution Equations**

**A. M. Stuart**

Durand 257  
Stanford University  
Stanford, CA 94305-4040

ONR  
800 N. Quincy Street  
Arlington, VA 22217-5660

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See attached
The overall objective of this work is to analyze and design effective computational algorithms for the integration of evolution equations over long time intervals. Many models of physical significance are characterized by the property of "sensitive dependence on initial conditions": small changes in the given data can make large changes in the detailed output of the model. Examples of such systems include weather or climate models in certain parameter regimes and turbulent flow problems. For such systems the effect of numerical approximation is not immediately clear. We may view numerical approximation as a small perturbation and the previous discussion indicates that this can nonetheless have a large effect on the detailed output from the model, over long time intervals. Thus it is important to know how to interpret data from such numerical simulations. Furthermore, in long-time integration, it is often crucial that the correct energy balance be used in the equation—be it dissipation or conservation. Thus it is important to design methods which replicate the energy balance in the equation under mild or no restrictions on the discretization parameters.

These objective have been achieved and the following list of Awards, Invited Presentations, Graduated Students and Publications are all directly related to the support obtained through this grant.

**Awards**

**Monroe Martin Prize in Applied Mathematics; Joint 1st Prize. February 1996**

Awarded every five years by the Institute of Physical Sciences and Technology, University of Maryland, to an individual under the age of 35, for an outstanding paper in applied mathematics. See [5b].


Awarded every six years by SIAM (the Society for Industrial and Applied Mathematics) for research over the six years preceding the award.

**Invited Presentations at Conferences**

Conference on Dynamical Numerical Analysis, Atlanta, Georgia; December 14th–16th 1995. "Software for Initial-Value Problems as a Discontinuous Dynamical System."

Research Supervision

• Gabriel Lord. PhD. (Currently an EPSRC post-doc in the Department of Engineering Mathematics at Bristol University.)
• Antony Humphries. PhD. (Currently a permanent faculty member in the Mathematics Department at Sussex University).
• Jeremy Smith. PhD. (Currently employed in a software company in silicone valley).
• Tony Shardlow. PhD. (Takes up a Postdoctoral Position at IMA Minnesota in 9/97).
Oscar Gonzalez. PhD. (Currently a post-doc at the Institute for Physical Sciences and Technology at the University of Maryland).


Fengshan Bai. Post-Doc. (Currently a permanent faculty member in Applied Mathematics at Tsinghua University, Beijing).

REFEREE PUBLICATIONS IN ARCHIVAL JOURNALS


[36] D.J. Higham and A.M. Stuart Analysis of the dynamics of error control via a piecewise continuous residual. Submitted to BIT.


OTHER PUBLICATIONS


