

HIGHLY ACCURATE ALGORITHM FOR TIME-DEPENDENT PDE'S

Hillel Tal-Ezer

Academic College of Tel-Aviv Yaffo, Israel

Abstract

standard space discretization of time-dependant pde's usually results in system of ode's of the form

$$u_t - Gu = s \tag{1}$$

where G is a linear operator (matrix) and u is a time-dependant solution vector. Highly accurate methods, based on polynomial approximation of a modified exponential evolution operator, had been developed already for this type of problems where s is a constant vector. In this talk we will discribe a new algorithm for the more general case where s is a time-dependent r.h.s vector. An iterative version of the new algorithm can be applied to the general case where G depends on t or, in the non-linear case, depends on u . Numerical results for schrödinger equation with time-dependant potential and to non-linear schrödinger equation will be presented.