Abstract Submitted
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Time-spectral solution of initial-value problems JAN SCHEFFEL, Division of Fusion Plasma Physics, KTH Royal Institute of Technology, Stockholm, Sweden — A time-spectral method for solutions of initial-value partial differential equations has recently been developed [1]. The purpose of the method is to avoid inefficient time stepping for problems in plasma physics with widely separated time scales. Temporal, spatial and parameter domains are all treated using an ansatz in the form of a sum of Chebyshev polynomials. The coefficients of the ansatz is determined using a generalized weighted residual method. A new, efficient solver for the resulting algebraic systems of coefficient equations has been developed [2]. In addition, subdomain methods for the temporal and spatial domains are employed [3]. The question is now: to what extent are time-spectral methods really more attractive than finite difference methods? We will report on results concerning accuracy and efficiency for several linear and nonlinear model partial differential equations.

[1] Scheffel J, Partial Differential Equations: Theory, Analysis and Applications (Nova Science Publishers) 2011, p 1-49.
[2] Scheffel J and Hakansson C, Appl. Numer. Math. 59(2009)2430.
[3] Scheffel J and Mirza A, Am. J. of Comp. Math. 2(2012)72.

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