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	<b>authors</b>	<ul style="list-style-type: none"><li>J. Scheffel</li><li>Kristoffer Lindvall</li></ul>	<b>authors</b>	<ul style="list-style-type: none"><li>Jan Scheffel</li><li>Kristoffer Lindvall</li></ul>		
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	<b>urls</b>	<ul style="list-style-type: none"><li>https://www.semanticscholar.org/paper/ffdc4d4b248797e0a8e5edee5980aaa0cd5ba93a</li></ul>	<b>urls</b>	<ul style="list-style-type: none"><li>http://arxiv.org/pdf/1704.04065v1</li><li>http://arxiv.org/abs/1704.04065v1</li><li>http://arxiv.org/pdf/1704.04065v1</li></ul>		
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	<b>abstract</b>	Time-spectral solution of ordinary and partial differential equations is often regarded as an inefficient approach. The associated extension of the time domain, as compared to finite difference methods, is believed to result in uncomfortably many numerical operations and high memory requirements. It is shown in this work that performance is substantially enhanced by the introduction of algorithms for temporal and spatial subdomains in combination with sparse matrix methods. The accuracy and efficiency of the recently developed time spectral, generalized weighted residual method (GWRM) are compared to that of the explicit Lax-Wendroff and implicit Crank-Nicolson methods. Three initial-value PDEs are employed as model problems; the 1D Burger equation, a forced 1D wave equation and a coupled system of 14 linearized ideal magnetohydrodynamic (MHD) equations. It is found that the GWRM is more efficient than the time-stepping methods at high accuracies. The advantageous scalings $N_t 1.0 N_s 1.43$ and $N_t 0.0 N_s 1.08$ were obtained for CPU time and memory requirements, respectively, with $N_t$ and $N_s$ denoting the number of temporal and spatial subdomains. For time-averaged solution of the two-time-scales forced wave equation, GWRM performance exceeds that of the finite difference methods by an order of magnitude both in terms of CPU time and memory requirement. Favorable subdomain scaling is demonstrated for the MHD equations, indicating a potential for efficient solution of advanced initial-value problems in, for example, fluid mechanics and MHD.	<b>abstract</b>	Time-spectral solution of ordinary and partial differential equations is often regarded as an inefficient approach. The associated extension of the time domain, as compared to finite difference methods, is believed to result in uncomfortably many numerical operations and high memory requirements. It is shown in this work that performance is substantially enhanced by the introduction of algorithms for temporal and spatial subdomains in combination with sparse matrix methods. The accuracy and efficiency of the recently developed time spectral, generalized weighted residual method (GWRM) is compared to that of the explicit Lax-Wendroff method and the implicit Crank-Nicolson method. Three initial-value PDEs are employed as model problems; the 1D Burger equation, a forced 1D wave equation and a coupled system of 14 linearized ideal magnetohydrodynamic (MHD) equations. It is found that the GWRM is more efficient than the time-stepping methods at high accuracies. For time-averaged solution of the two-time-scales, forced wave equation GWRM performance exceeds the finite difference methods by an order of magnitude both in terms of CPU time and memory requirement. Favourable scaling of CPU time and memory usage with the number of temporal and spatial subdomains is demonstrated for the MHD equations.		
	<b>versions</b>		<b>versions</b>			