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**Numerical solution of nonlinear Jaulent-Miodek and Whitham-Broer-Kaup equations.** (English) Zbl 1266.65176

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**Summary:** We investigate the numerical solution of Jaulent-Miodek (JM) and Whitham-Broer-Kaup (WBK) equations. The proposed numerical schemes are based on the fourth-order time-stepping schemes in combination with discrete Fourier transform. We discretize the original partial differential equations with discrete Fourier transform in space and obtain a system of ordinary differential equations (ODEs) in Fourier space which are solved with fourth-order time-stepping methods. After transforming the equations to a system of ODEs, the linear operator in the JM equation is diagonal, but in the WBK equation it is not diagonal. However, for the WBK equation we can also implement the methods such as diagonal case which reduces the CPU time. Comparing numerical solutions with analytical solutions demonstrate that those methods are accurate and readily implemented.

**MSC:**

- [65M70](#) Spectral, collocation and related methods for initial value and initial-boundary value problems involving PDEs
- [35Q35](#) PDEs in connection with fluid mechanics
- [65T50](#) Numerical methods for discrete and fast Fourier transforms
- [65M20](#) Method of lines for initial value and initial-boundary value problems involving PDEs

Cited in **5** Documents

**Keywords:**

Jaulen-Miodek equation; Whitham-Broer-Kaup equation; exponential time differencing; integrating factor; spectral methods; high accuracy; numerical examples; semidiscretization; discrete Fourier transform

**Software:**

[Matlab](#)

**Full Text:** [DOI](#)

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