

New Weierstrass Semi-rational Expansion Method to Doubly Periodic Solutions of Soliton Equations

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Abstract: Based on the Weierstrass elliptic function equation, a new Weierstrass semi-rational expansion method and its algorithm are presented. The main idea of the method changes the problem solving soliton equations into another one solving the corresponding set of nonlinear algebraic equations. With the aid of Maple, we choose the modified KdV equation, (2+1)-dimensional KP equation, and (3+1)-dimensional Jimbo-Miwa equation to illustrate our algorithm. As a consequence, many types of new doubly periodic solutions are obtained in terms of the Weierstrass elliptic function. Moreover the corresponding new Jacobi elliptic function solutions and solitary wave solutions are also presented as simple limits of doubly periodic solutions.

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Key words: soliton equations, Weierstrass elliptic function, doubly periodic solution, symbolic computation

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