

## Travelling Wave Solutions to a Special Type of Nonlinear Evolution Equation

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**Abstract:** A unified approach is presented for finding the travelling wave solutions to one kind of nonlinear evolution equation by introducing a concept of "rank". The key idea of this method is to make use of the arbitrariness of the manifold in Painlevé analysis. We selected a new expansion variable and thus obtained a rich variety of travelling wave solutions to nonlinear evolution equation, which covered solitary wave solutions, periodic wave solutions, Weierstrass elliptic function solutions, and rational solutions. Three illustrative equations are investigated by this means, and abundant travelling wave solutions are obtained in a systematic way. In addition, some new solutions are firstly reported here.

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Key words: Painlevé analysis, rank, travelling wave solution, nonlinear evolution equation

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