Double-Parameter Solutions of Projective Riccati Equations and Their Applications

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Abstract: The purpose of the present paper is twofold. First, the projective Riccati equations (PREs for short) are resolved by means of a linearized theorem, which was known in the literature. Based on the signs and values of coefficients of PREs, the solutions with two arbitrary parameters of PREs can be expressed by the hyperbolic functions, the trigonometric functions, and the rational functions respectively, at the same time the relation between the components of each solution to PREs is also implemented. Second, more new travelling wave solutions for some nonlinear PDEs, such as the Burgers equation, the mKdV equation, the NLS^+ equation, new Hamilton amplitude equation, and so on, are obtained by using Sub-ODE method, in which PREs are taken as the Sub-ODEs. The key idea of this method is that the travelling wave solutions of nonlinear PDE can be expressed by a polynomial in two variables, which are the components of each solution to PREs, provided that the homogeneous balance between the higher order derivatives and nonlinear terms in the equation is considered.

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