An Invariance for (2+1)-Extension of Burgers Equation and Formulae to Obtain Solutions of KP Equation

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Abstract: In this article, we study the (2+1)-extension of Burgers equation and the KP equation. At first, based on a known Bäcklund transformation and corresponding Lax pair, an invariance which depends on two arbitrary functions for (2+1)-extension of Burgers equation is worked out. Given a known solution and using the invariance, we can find solutions of the (2+1)-extension of Burgers equation repeatedly. Secondly, we put forward an invariance of Burgers equation which cannot be directly obtained by constraining the invariance of the (2+1)-extension of Burgers equation. Furthermore, we reveal that the invariance for finding the solutions of Burgers equation can help us find the solutions of KP equation. At last, based on the invariance of Burgers equation, the corresponding recursion formulae for finding solutions of KP equation are digged out. As the application of our theory, some examples have been put forward in this article and some solutions of the (2+1)-extension of Burgers equation, Burgers equation and KP equation are obtained.

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