Approximate Symmetry Reduction Approach: Infinite Series Reductions to the KdV-Burgers Equation

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For weak dispersion and weak dissipation cases, the (1+1)-dimensional KdV-Burgers equation is investigated in terms of approximate symmetry reduction approach. The formal coherence of similarity reduction solutions and similarity reduction equations of different orders enables series reduction solutions. For the weak dissipation case, zero-order similarity solutions satisfy the Painlevé II, Painlevé I, and Jacobi elliptic function equations. For the weak dispersion case, zero-order similarity solutions are in the form of Kummer, Airy, and hyperbolic tangent functions. Higher-order similarity solutions can be obtained by solving linear variable coefficients ordinary differential equations.

Key words: KdV-Burgers Equation; Approximate Symmetry Reduction; Series Reduction Solutions
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