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Dynamics of Periodic Waves in Bose--Einstein Condensate with Time-Dependent Atomic Scattering Length

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Abstract: Evolution of periodic waves and solitary waves in Bose-Einstein condensates (BECs) with time-dependent atomic scattering length in an expulsive parabolic potential is studied. Based on the mapping deformation method, we successfully obtain periodic wave solutions and solitary wave solutions, including the bright and dark soliton solutions. The results in this paper include some in the literatures [Phys. Rev. Lett. 94 (2005) 050402 and Chin. Phys. Lett. 22 (2005) 1855].

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Key words: Gross-Pitaevskii equation, periodic wave, time-dependent atomic scattering length, mapping deformation method

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