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New Cyclic Identities and Generalized Landen Transformation Formulas for Jacobi Elliptic Functions.

Many nonlinear evolution equations of physical interest possess periodic traveling wave solutions involving Jacobi elliptic functions. We show that suitable linear combinations of these known periodic solutions yield additional solutions with different periods and velocities. This type of linear superposition for nonlinear equations works by virtue of some remarkable new cyclic identities involving Jacobi elliptic functions. We show that the linearly superposed solutions are related to known periodic solutions via a generalization of the Landen transformation formulas connecting elliptic functions with different modulus parameters. (Received February 26, 2007)