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Call Box 9000, Mayagüez, PR 00681-900. *Method of separation of variables for Schrödinger
equation with time-dependent quadratic Hamiltonians*. Preliminary report.

We will discuss applications of the method of separation of variables in the study of linear and nonlinear Schrödinger equations with quadratic time-dependent Hamiltonians. In the latter we construct soliton-like solutions for certain choices of the coefficients, including important examples such as bright and dark solitons and Jacobi elliptic and second Painlevé transcendental solutions, which are important for current research in nonlinear optics and Bose–Einstein condensation. In the linear case we are able to construct the fundamental solution explicitly. We will give several examples inspired from solvable cases of the Riccati equation and emphasize an example involving Airy functions. A large part of the results presented have been done in joint work with Sergei K. Suslov. (Received January 19, 2011)