Exact solutions to integrable nonlinear evolution equations

T. Aktosun, F. Demontis, and C. van der Mee
Department of Mathematics
University of Texas at Arlington
Arlington, Texas 76019, USA
aktosun@uta.edu

A review is presented for the method of constructing explicit solutions to integrable evolution equations in terms of a matrix triplet. The construction is based on solving the associated Marchenko integral equations explicitly by representing their kernels in terms of a matrix triplet, using matrix exponentials, and exploiting the separability of those kernels. Once an explicit formula is obtained for the relevant integrable evolution equation, it is usually possible to independently verify that the formula does indeed satisfy the corresponding nonlinear evolution equation. Such exact solutions can alternatively be written explicitly as algebraic combinations of exponential, trigonometric, and polynomial functions of the spatial and temporal coordinates. The method is illustrated with some explicit examples.