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**Rudi Weikard\*** ([rudi@math.uab.edu](mailto:rudi@math.uab.edu)), Department of Mathematics, University of Alabama at Birmingham, Birmingham, AL 35294-1170. *Inverse scattering for a left-definite problem.*

The Camassa-Holm equation is a nonlinear evolution equation describing certain wave phenomena. The Cauchy problem for this PDE can be tackled by solving a scattering and an inverse scattering problem for the linear Sturm-Liouville equation  $-y'' + y = \lambda wy$  where  $\lambda$  is a complex parameter and  $w$  a function connected to the Camassa-Holm equation.

Particularly interesting, since it is related to wave breaking, is the case where  $w$  changes sign. This prevents setting up the problem in  $L^2(w)$ . Instead one can use the left-hand side of the equation to define a positive-definite inner product forming the basis for a spectral and scattering theory.

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