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# Wave phenomena of the Toda lattice with steplike initial data

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## Abstract

We give a survey of the long-time asymptotics for the Toda lattice with steplike constant initial data using the nonlinear steepest descent analysis and its extension based on a suitably chosen  $g$ -function. Analytic formulas for the leading term of the asymptotic solutions of the Toda shock and rarefaction problems (including the case of overlapping background spectra) are given and complemented by numerical simulations. We provide an explicit formula for the modulated 2-band solution in terms of Abelian integrals on the underlying hyperelliptic Riemann surface.

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