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Integrability and Wave Breaking

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The reduced Ostrovsky equation is a modification of the Korteweg-de Vries equation, in which the usual linear dispersive term with a third-order derivative is replaced by a linear non-local integral term, which represents the effect of background rotation. This equation is integrable provided a certain curvature constraint is satisfied. We demonstrate, through theoretical analysis and numerical simulations, that when this curvature constraint is not satisfied at the initial time, then wave breaking inevitably occurs. Analogous results are also presented for the reduced modified Ostrovsky equation in which the usual quadratic nonlinear term is replaced by a cubic nonlinear term.