

**Harris, Shirley E.; Clarkson, Peter A.**

**Painlevé analysis and similarity reductions for the magma equation.** (English) Zbl 1132.35328  
SIGMA, Symmetry Integrability Geom. Methods Appl. 2, Paper 068, 17 p. (2006).

Summary: We examine a generalized magma equation for rational values of two parameters,  $m$  and  $n$ . Firstly, the similarity reductions are found using the Lie group method of infinitesimal transformations. The Painlevé ODE test is then applied to the travelling wave reduction, and the pairs of  $m$  and  $n$  which pass the test are identified. These particular pairs are further subjected to the ODE test on their other symmetry reductions. Only two cases remain which pass the ODE test for all such symmetry reductions and these are completely integrable. The case when  $m = 0, n = -1$  is related to the Hirota-Satsuma equation and for  $m = \frac{1}{2}, n = -\frac{1}{2}$ , it is a real, generalized, pumped Maxwell-Bloch equation.

**MSC:**

[35C05](#) Solutions to PDEs in closed form

[35Q58](#) Other completely integrable PDE (MSC2000)

[37K10](#) Completely integrable infinite-dimensional Hamiltonian and Lagrangian systems, integration methods, integrability tests, integrable hierarchies (KdV, KP, Toda, etc.)

Cited in **6** Documents

**Keywords:**

[Painlevé analysis](#); [similarity reductions](#); [magma equation](#)

**Software:**

[SYMMGRP](#)

**Full Text:** [DOI](#) [EMIS](#) [EuDML](#) [arXiv](#)