

# Universality for Scalar Nonlinear Waves

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## Abstract

In the long-wave regime, nonlinear waves may undergo a phase transition from a smooth to a fast oscillatory behaviour. We study this phenomenon, commonly known as dispersive shock, in the light of Dubrovin's universality conjecture, and we argue that the transition can be described by a special solution of a model universal partial differential equation. This universal solution is constructed by means of a string equation. We provide a classification of universality classes and the explicit description of the transition by means of special functions, extending Dubrovin's universality conjecture to a wider class of equations. In particular, we show that Benjamin-Ono equation belongs to a novel universality class with respect to the ones known in the literature, and we compute its string equation exactly.

Joint work with A. Raimondo and P. Antunes [1, 2].

## References

- [1] Masoero D., Raimondo R. , “ A deformation of the method of characteristics and the Cauchy problem for Hamiltonian PDEs in the small dispersion limit,” *Int. Math. Res. Not.*, doi: 10.1093/imrn/rnt223, (2013).
- [2] Masoero D., Raimondo R. , Antunes P., “Critical behaviour for scalar nonlinear waves,” Preprint [arXiv:1312.3880](https://arxiv.org/abs/1312.3880), (2013).