Stability of discrete shock profiles for systems of conservation laws

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This talk deals with the stability analysis of discrete shock profiles for systems of conservation laws. These profiles correspond to approximations of discontinuous traveling waves by conservative finite difference schemes. Such discontinuous solutions appear naturally in the study of conservation law systems, which can model many physical situations, such as gas dynamics. Existence and stability of discrete shock profiles for each stable shock of the approximated system of conservation laws is seen as an improved consistency condition and implies that the finite difference scheme should approach discontinuities fairly precisely.

The aim of the talk will be to review some stability results regarding discrete shock profiles and to present a recent effort to extend them. More precisely, most results known up until recently are focused on the stability of discrete shock profiles associated with shocks of small amplitude. The talk will focus on a nonlinear stability result for discrete shock profiles in quite a general setting, where the smallness assumption on the shock's amplitude is replaced by a spectral stability assumption on the linear operator obtained by linearizing the numerical scheme about the discrete shock profile. This nonlinear stability result relies on a precise description of the Green's function of the linearization about discrete profiles presented in [1].

Références

[1] L. Coeuret, *Linear stability of discrete shock profiles for systems of conservation laws*, ArXiV : https ://arxiv.org/abs/2311.02507 (2023)

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