

# Global existence to a diagonal hyperbolic system for any $BV$ initial data

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In this work, we study the existence of solutions for a diagonal hyperbolic system, that is not necessarily strictly hyperbolic, in one space dimension, considering discontinuous  $BV$  initial data without any restrictions on the size of its norm. This system appears naturally in various physical domains, particularly in isentropic gas dynamics and dislocation dynamics in materials. In the case of strictly hyperbolic systems, Bianchini and Bressan (2005) presented a global existence and uniqueness result assuming the initial data has small total variation. In the case where the system is not necessarily strictly hyperbolic, El Hajj and Monneau (2012), have shown the global existence and uniqueness of a continuous solution considering large non-decreasing initial data. Let us also mention that a global existence result of a continuous solution has been made by El Hajj, Ibrahim and Rizik (2018), where they considered certain monotony on the velocities of the system and the initial data. In our work, we show the global in time existence of discontinuous viscosity solutions to a diagonal hyperbolic system that is not necessarily strictly hyperbolic, for every initial data of bounded total variation, without the assumption that the system is strictly hyperbolic, and without any monotony supposition on the velocities. Up to our knowledge, this is the first global existence result of large discontinuous solutions to this system.

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