On the Conditional Global Regularity of the 1-D Euler-Poisson Equations with Pressure

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We prove that the one-dimensional Euler-Poisson system driven by the Poisson forcing together with the usual γ-law pressure($\gamma \geq 1$) admits global solutions for a large class of initial data. Thus, the Poisson forcing regularizes the generic finite-time breakdown in the 2×2 p-system. Global regularity is shown to depend on whether the initial configuration of the Riemann Invariants and density crosses an intrinsic critical threshold.