Poster 2 Vandenboomgaerde

Analytic model for the single-mode Richtmyer-Meshkov instability from the linear to the nonlinear regime

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The Richtmyer-Meshkov instability (IRM) is involved in several physical phenomena such as, for example, inertial confinement fusion (ICF). This instability can break the symmetry of the implosion and reduce the fusion gain. The nonlinear regime of the IRM has been studied by numerous authors (A.L. Velokovich *et al.* 1996, Q. Zhang *et al.* 1997, M. Vandenboomgaerde *et al.* 2002), but algebraic solutions have a limited range of validity. They exhibit a secular behavior.

This study is an attempt to solve this problem by describing the non-linear growth of the IRM with ordinary differential equations. The equations which describe the dynamics of a single-mode Richtmyer-Meshkov instability are simplified using a change of variable. The shape of the interface and the velocity potentials are expressed as Fourier series. These series are introduced in the system, and the following technics are used:

assumptions about the order of some expressions are made;

as the IRM saturates with time, the analytic solution must not diverge. So, the expressions leading to divergent solutions are assumed to be cancelled by infinite sums of smaller order terms.

At first order, this leads to an differential equation for the growth of the fundamental. Other orders can be taken into account leading to a set of differential equations. The saturation of the linear growth of the IRM is found. Comparisons with experimental data and 2D numerical simulations are presented.

References

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