On the Landau damping

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March 21 - 23, 2009

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Abstract

Landau damping [5] may be the single most famous mystery of classical plasma
physics, and is of tremendous importance in galactic dynamics [1]. For the past sixty
years it has been treated in the linear setting at various degrees of rigor [3, 6]; but its
nonlinear version has remained elusive, since the only available results [2, 4] prove the
existence of some damped solutions, without telling anything about their genericity.

In the present work we aim to close this gap by treating the nonlinear version
of Landau damping, under assumptions which cover both attractive and repulsive
interactions. For this we shall be led to develop a whole theory, complete with its own
functional spaces and functional inequalities, we shall get new insights in the physics
of the problem, and identify new mathematical phenomena.

References

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(N.S.) 127(169) 445–475, 559.