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TITLE: Singularity and decay estimates of solutions of nonlinear partial differential equations via scaling and Liouville-type theorems

ABSTRACT:

Many important mathematical models in physics are described by nonlinear partial differential equations which are scaling invariant. Solutions of such problems can either be regular or may develop singularities. In both cases, rescaling and Liouville-type theorems (guaranteeing nonexistence or explicit description of all solutions of a limit of rescaled problems) can often be used in order to describe the precise asymptotic behavior of solutions.

We will first mention a few famous problems studied by methods based on scaling arguments and Liouville-type theorems and then we will describe one of such methods in detail. In order to do so, we will consider an elliptic problem whose solutions correspond to the solitary waves of nonlinear Schroedinger equations.