

# FINITE DIMENSIONALITY OF THE GLOBAL ATTRACTOR FOR A CLASS OF NONLINEAR DISSIPATIVE EQUATIONS

Eduardo Arbieto Alarcon

Universidade Federal de Goiás - IME

## Resumo/Abstract:

The purpose of this article is to complement the results presented in the previous article [1] on the Cauchy problem for dissipative perturbations of Hamiltonian systems. More precisely, we are interested in the properties of the solutions to problems of the form

$$\begin{cases} \partial_t u = -\mu Au + J\Phi'(u) + f \in X \\ u(0) = u_0 \in H, \end{cases} \quad (1)$$

where  $\mu > 0$ ,  $H$  and  $X$  are reflexive Banach, spaces,  $u : [0, T] \rightarrow H$  for some  $T > 0$ ,  $A : \mathcal{D}(A) \subset \mathcal{X} \rightarrow \mathcal{X}$  is a linear operator,  $(-\mu Au)$  is the damping term,  $\Phi'$  denotes the Gateaux (i.e. directional) derivative of the real valued functional  $\Phi$ , called the Hamiltonian of the system,  $J$  is a skewsymmetric operator and  $f$  is a time independent external excitation. See [2].

A very large variety of problems arising in physics and engineering may be written as in (1), that is, as dissipative perturbations of conservative equations. Among these one finds nonlocal dispersive wave equations, the Ott-Sudan equation, the damped, modified Korteweg-de Vries equation, the damped Benjamin-Ono equation and dispersive nonlinear Schrödinger equations.

Our purpose here is to study the finite dimensionality of global attractors associated to such problems (fractal and Hausdorff dimensions).

## References

- [1] E. A. ALARCON AND R. J. IORIO, JR.- *The existence of global attractors for a class of nonlinear dissipative evolution equa-*

tions, Proc. Roy. Soc. Edinburgh Sect. A 135 (2005), no. 5, 887-913.

- [2] T. KATO *Weak solutions of infinite-dimensional Hamiltonian systems*, Frontiers in Pure and Applied Mathematics, R Dautray ed., 133–149, North-Holland, Amsterdam, (1991).