

Centro de Investigação em Matemática e Aplicações
Departamento de Matemática
Programa de Doutoramento em Matemática

Seminário

14 de março de 2018
CLAV – Anfiteatro 1 – 14h30

HETEROCLINIC AND HOMOCLINIC SOLUTIONS FOR NONLINEAR SECOND-ORDER COUPLED SYSTEMS WITH PHI-LAPLACIANS

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Abstract: We present sufficient conditions for the existence of heteroclinic or homoclinic solutions for second order coupled systems of differential equations on the real line, more precisely, we consider

$$\begin{cases} \left(\phi(u'(t)) \right)' = f(t, u(t), v(t), u'(t), v'(t)), \\ \left(\psi(v'(t)) \right)' = h(t, u(t), v(t), u'(t), v'(t)), t \in \mathbb{R}, \end{cases}$$

with ϕ and ψ increasing homomorphisms verifying some adequate relations on their inverses, $f, h: \mathbb{R}^5 \rightarrow \mathbb{R}$ are L^1 -Carathéodory functions, and the asymptotic conditions

$$\begin{cases} u(-\infty) = A, u(+\infty) = B, \\ u(-\infty) = C, u(+\infty) = D, \end{cases}$$

for $A, B, C, D \in \mathbb{R}$, satisfying some relations, and where

$$u(\pm\infty) := \lim_{t \rightarrow \pm\infty} u(t), \quad v(\pm\infty) := \lim_{t \rightarrow \pm\infty} v(t).$$

The arguments apply the fixed point theory, Green's functions technique, L^1 -Carathéodory functions and Schauder's fixed point theorem. Finally, an application to a family of second order nonlinear coupled systems of two degrees of freedom, show the applicability of the main theorem.