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CENTRO DE MATEMÁTICA E APLICAÇÕES FUNDAMENTAIS
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Mês de: ABRIL 2014

SEMINÁRIO DE ANÁLISE E EQUAÇÕES DIFERENCIAIS

(Nova Alteração de dia)

Dia 16 de Abril (quarta-feira), às 14h, na Sala B3-01

Oscillation and non-oscillation criteria for half-linear Emden-Fowler type systems

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Abstract:

On the half-line $[0, +\infty[$ we consider the two-dimensional half-linear Emden-Fowler type system

$$\begin{aligned} u' &= g(t)|v|^{1/\alpha} \operatorname{sgn} v, \\ v' &= p(t)|u|^{\alpha} \operatorname{sgn} u, \end{aligned} \tag{1}$$

where $g, p\colon [0, +\infty[\to \mathbb{R}$ are locally integrable functions, $\alpha > 0$, and $g(t) \geq 0$ for a. e. $t \geq 0$. A frequently studied particular case of system (1) is the half-linear second-order differential equations with the q-Laplacian

$$\big(r(t)\Phi_q(u')\big)' + c(t)\Phi_q(u) = 0 \tag{2}$$

in which $\Phi_q(x) := |x|^{q-1} \operatorname{sgn} x$, $q > 1$, $r, c\colon [0, +\infty[\to \mathbb{R}$ are continuous functions, and r is positive.

The Hartman-Wintner theorem for equation (2) is well-known in the case, where

$$\int_0^{+\infty} r^{1-q}(s)\mathrm{d}s = +\infty, \tag{3}$$

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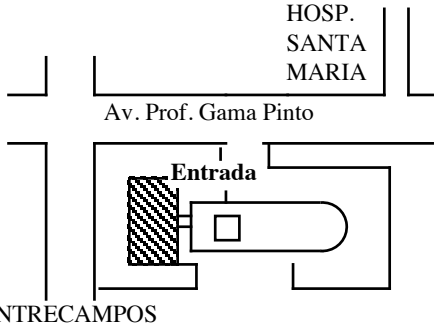

which allows one to derive further oscillation and non-oscillation criteria of Hille and Nahari type (see, e. g., [1, 2, 3]). As for the case, where

$$\int_0^{+\infty} r^{1-q}(s)\mathrm{d}s < +\infty, \tag{4}$$

as far as we know, the Hartman-Wintner theorem and some Hille and Nahari type oscillation criteria are proved only under the additional assumption that $c(t) \geq 0$ for $t \geq 0$ (see, e. g., survey given in [1]).

The aim of our talk is to present the Hartman-Wintner theorem and some oscillation and non-oscillation criteria for system (1), which essentially generalise known results in the case, where $\int_0^{+\infty} g(s)\mathrm{d}s = +\infty$ (corresponding to (3)), and do not require the assumption $p(t) \leq 0$ for a. e. $t \geq 0$ in the contrary case $\int_0^{+\infty} g(s)\mathrm{d}s < +\infty$ (corresponding to (4)).

References

[1] O. Došlý, P. Řehák, Half-linear differential equations, North-Holland Mathematics Studies, 202, Elsevier, Amsterdam, 2005.

[2] N. Kandelaki, A. Lomtatidze, D. Ugulava, *On oscillation and nonoscillation of a second order half-linear equation*, Georgian Math. J. **7** (2000), No. 2, p. 329–346.

[3] J. D. Mirzov, Asymptotic properties of solutions of systems of nonlinear nonautonomous ordinary differential equations, Folia Facul. Sci. Natur. Univ. Masar. Brun., Mathematica 14, Brno: Masaryk University, 2004.

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