

# Second order problems with nonlinear functional conditions

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## Abstract

In this talk we consider second order problems of the type

$$(P^*) \begin{cases} -\frac{d}{dt}\varphi(t, u, u(t), u'(t)) = f(t, u, u(t), u'(t)) \text{ for a.e. } t \in I, \\ L_1(u(a), u'(a), u) = 0, \\ L_2(u(b), u'(b), u) = 0, \end{cases}$$

where  $\varphi$  satisfies some regularity conditions,  $f$  is a locally  $L^1$ -bounded Carathéodory function, and  $L_i$ ,  $i = 1, 2$ , are continuous functions that satisfy suitable monotonicity assumptions.

It is important to note that both in the nonlinear part of the equation and in the nonlinear boundary value conditions, functional dependence on the solutions is treated. Such dependence allows us to consider, amongst others, integro - differential equations, delay equations or equations with maxima coupled with Sturm - Liouville or Multipoint boundary conditions under the same formulation.

The existence results are deduced by assuming the existence of a pair of ordered lower and upper solutions.

The proofs follow from a priori bounds and Fixed Point Theory.

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