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Special Session: Topological and impulsive methods for  
the qualitative analysis of differential equations,  
differential inclusions and difference equations

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**Title:** Multiplicity of positive periodic solutions for a superlinear indefinite problem:  
a topological approach

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**Abstract:**

We consider the second order nonlinear differential equation

$$u'' + cu' + (a^+(t) - \mu a^-(t))g(u) = 0,$$

where  $g(u)$  has superlinear growth at zero and at infinity,  $a(t)$  is a periodic sign-changing weight,  $c \in \mathbb{R}$  and  $\mu > 0$  is a real parameter. We prove the existence of  $2^m - 1$  positive solutions when  $a(t)$  has  $m$  positive humps separated by  $m$  negative ones (in a periodicity interval) and  $\mu$  is sufficiently large. The proof is based on the extension of Mawhin's coincidence degree defined in open (possibly unbounded) sets. Our method also provides a topological approach to detect infinitely many subharmonic solutions and to study positive solutions with complex behavior. This is a joint work with F. Zanolin (University of Udine, Italy).