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SEMINAR

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First and second order nonlinear coupled systems with impulses – Existence and localization of periodic solutions

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Abstract

We present some existence and localization results for periodic solutions of first and second order nonlinear coupled systems of two equations, with and without impulses. The existence arguments for first-order problems are based on Schauder's Fixed Point Theorem [1] together with the upper and lower solution method. For second order non-impulsive systems, the existence of solutions is assured by a variation of the Nagumo condition and the Topological Degree Theory. For second order impulsive systems, we prove the existence using Green functions and Schauder's Fixed Point Theorem. Two novelties is that periodicity is not required for the nonlinearities, and that the upper and lower solutions need not to be necessarily well-ordered. For the impulsive analysis, results on equi-regulated functions [2, 3] are required. We present different applications to illustrate the main results.

References

[1] E. Zeidler, P.R. Wadsack (1993) Nonlinear Functional Analysis and Its Applications: Fixed-point Theorems/Transl. by Peter R. Wadsack, Springer-Verlag.

[2] D. Fraňková (1991) Regulated functions, Mathematica Bohemica, 116(1), 20–59.

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