Component-wise localization of solutions for nonlinear systems: a fixed point index approach

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In this talk, we consider the existence of solutions for operator systems of the form

$$\begin{cases} u_1 = T_1(u_1, u_2), \\ u_2 = T_2(u_1, u_2), \end{cases}$$

where Krasnosel'skiĭ type compression-expansion conditions are imposed independently in each component, T_1 and T_2, of the system. In this way, it is possible to obtain a solution $(\bar{u}_1, \bar{u}_2)$ where both $\bar{u}_1$ and $\bar{u}_2$ are non-trivial and each one can be localized in a suitable conical shell.

This fixed point theorem was firstly proven by Precup in [1], but we present an alternative approach based on fixed point index computations which enlarges the applicability of the original result, see [2].

References

[1] R. Precup, A vector version of Krasnosel'skiĭ's fixed point theorem in cones and positive periodic solutions of nonlinear systems, *J. Fixed Point Theory Appl.* **2** (2007), 141–151.

[2] J. Rodriguez-López, A fixed point index approach to Krasnosel'skiĭ-Precup fixed point theorem in cones and applications, *Nonlinear Anal.*, **226** (2023), No. 113138, 1–19.

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