A fixed point index approach to a third order boundary value problem

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In this poster, using a topological approach, we present sufficient conditions for the existence of positive increasing solutions to a third order differential equation

$$-u''' + m^2 u' = f(t, u, u'), \quad t \in [0, 1], \tag{1}$$

subject to the non-local boundary conditions

$$u(0) = 0, \ u'(0) = \alpha[u], \ u'(1) = \beta[u], \tag{2}$$

where m is a positive parameter and α and β are the functionals acting on the space $C^1[0, 1]$. The technique we use is based on the fixed point index theorem for compact operators in cones applied to a perturbed Hammerstein equation. As far as we know the cone that we use was for the first time exploited in our recently published paper [1], to which we refer recalling the properties of the Green's function associated with the problem (1)-(2).

References

[1] G. Szajnowska, M. Zima, *Positive solutions to a third order nonlocal boundary value problem*, Opuscula Math. 44, no. 2, 267–283 (2024)

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