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NONLINEAR BOUNDARY VALUE PROBLEM WITH STEPWISE FUNCTION

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The differential equations of the form

$$x'' = -ax + \beta(t)x^3, \tag{1}$$

and

$$x'' = ax + \alpha(t)x^2 + \beta(t)x^3 \tag{2}$$

are considered together with the boundary condition

$$x(0) = 0, \quad x(1) = 0. \tag{3}$$

We assume that $\beta(t)$ in equation (1) is a stepwise function with two jumps [1]

$$\beta(t) = \begin{cases} b, & t \in [0, \delta) \quad \text{or} \quad t \in (1-\delta, 1], \\ 0, & t \in [\delta, 1-\delta] \end{cases} \tag{4}$$

and $\alpha(t)$, $\beta(t)$ in (2) are stepwise functions with one jump

$$\alpha(t) = \begin{cases} 0, & t \in [0, \delta), \\ b, & t \in [\delta, 1], \end{cases} \tag{5}$$

$$\beta(t) = \begin{cases} b, & t \in [0, \delta), \\ 0, & t \in [\delta, 1], \end{cases} \tag{6}$$

where $0 < \delta < 0.5$.

We evaluate the number of solutions to problems (1), (3) and (2), (3) in terms of parameters b and δ.

REFERENCES

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