

Monotone Methods for Boundary Value Problems at Resonance

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Abstract: We consider a simple boundary value problem at resonance for an ordinary differential equation. We employ a shift argument and construct a regular fixed point operator. We employ the monotone method coupled with a method of upper and lower solutions and obtain sufficient conditions for the existence of solutions of boundary value problems at resonance for nonlinear boundary value problems. We present three applications in which explicit upper solutions and lower solutions are exhibited. Of interest, the upper and lower solutions are elements of the kernel of the linear problem at resonance.