

NOTES ON NONLINEAR SPECTRA

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We investigate the asymptotics of Fučík spectra ([1, §35.4]) for the second order boundary value problem

$$u'' = -\mu^2 u^+ + \lambda^2 u^-, \quad u^+ = \max\{u, 0\}, \quad u^- = \max\{-u, 0\}, \quad (1)$$

$$u(0) = u(\pi) = 0. \quad (2)$$

We show that there exists a one-parametric family of equations of the form (1), which includes the eigenvalue problems.

Namely, the family of equations is given by

$$u'' + u^+ - \alpha^2 u^- = 0, \quad \alpha \in (0, +\infty) \quad (3)$$

$$u'' + \left(\frac{1-\beta}{\beta}\right)^2 u^+ - (1-\beta)^2 u^- = 0, \quad \beta \in (-\infty, 0) \quad (4)$$

$$u'' + \left(\frac{2\beta+1}{\beta}\right)^2 u^+ - (2\beta+1)^2 u^- = 0, \quad \beta \in (0, +\infty) \quad (5)$$

$$u'' + \left(\frac{2-2\delta}{\delta}\right)^2 u^+ - (2-2\delta)^2 u^- = 0, \quad \delta \in (-\infty, 0) \quad (6)$$

$$u'' + \left(\frac{3\delta+2}{\delta}\right)^2 u^+ - (3\delta+2)^2 u^- = 0, \quad \delta \in (0, +\infty), \quad (7)$$

and so on. Each of the equations (3), (4), (5) and so on together with the boundary conditions (2) has a nontrivial solution. We give also the geometrical interpretation of this parametrization.

REFERENCES

- [1] A. Kufner and S. Fučík. *Nonlinear differential equations*. Elsevier Scientific, Amsterdam-New York, 1980.