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Bounded solutions of boundary value problems in Hilbert space

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The report is devoted to obtaining of necessary and sufficient conditions for existence of bounded on the whole axis solutions of boundary value problem in the Hilbert space H

$$\frac{d\psi(\mathrm{t},\varepsilon)}{dt} = A(\mathrm{t})\psi(\mathrm{t},\varepsilon) + \varepsilon\, \mathrm{Z}(\psi(\mathrm{t},\varepsilon),\mathrm{t},\varepsilon) + \mathrm{f}(\mathrm{t}), \quad (1)$$

$$l\psi(\cdot) = \alpha, \quad (2)$$

where A(t) – bounded operator-function, Z is Frechet differentiable, vector-function f(t) is bounded, and operator l is bounded and acts from the Hilbert space H into Hilbert space H_1; α is element of H_1.

The main result is obtained under assumption that the homoheneous equation

$$\frac{d\psi(\mathrm{t})}{dt} = A(\mathrm{t})\psi(\mathrm{t}) + + \mathrm{f}(\mathrm{t}), \quad (3)$$

admits an exponential dichotomy on semi-axes [1].

[1] O.O. Pokutnyi. Bounded solutions of linear and weakly nonlinear differential equations in Banach space with unbounded linear part. Differential equations no.6, v.48, 2012 (in Russian). – p. 803 – 813.