

POTENTIALITY, GROUP SYMMETRY AND BIFURCATION IN THE THEORY OF BRANCHING EQUATION

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Abstract. The problem of potentiality of the branching equation is considered. Theorems of existence of bifurcation points are stated and a connection between group symmetry and potentiality of a branching equation is exposed.

Introduction. In this paper, a new approach to the problem of potentiality of the branching equation (BEq) is proposed, the general theorem of existence of bifurcation points is stated and a connection between group symmetry and potentiality of BEq is exposed. The background of this paper is the preceding co-operative investigations of the authors [3-7], [10-13], [17]. As earlier, in accordance with [15] and in contrast to [1], [2], and [18], the authors tend to the maximal usage of finite dimensionality of the arising situation. For instance, the idea of direct application of the mapping degree directly to EBq was realized in the theorems on bifurcation points [12], [10], [8], including the potential case. The technique of application of group-theoretic approach in branching theory problems was for the first time presented in [3] and [7], a more complete presentation can be found in [6] and [14].

1. Conditions of potentiality of BEq. Let E_1 , E_2 be real Banach spaces, Λ be a real normed space. We consider the equation

$$Bx = R(x, \lambda), \quad (1)$$

where $B : D \subset E_1 \rightarrow E_2$ is a closed linear operator with dense domain of definition and the continuous operator $R(x, \lambda)$ maps the set $\Omega = \{x \in E_1, \lambda \in \Lambda \mid \|x\| < r, \|\lambda\| < \rho\}$ into E_2 .

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