Zhukovskiy, E. S.
Comparison method for studying equations in metric spaces. (English. Russian original) [Zbl 07289060]

Summary: We consider the equation \( G(x, x) = y \), where \( G : X \times X \to Y \) and \( X \) and \( Y \) are metric spaces. This operator equation is compared with the “model” equation \( g(t, t) = 0 \), where the function \( g : \mathbb{R}_+ \times \mathbb{R}_+ \to \mathbb{R} \) is continuous, nondecreasing in the first argument, and nonincreasing in the second argument. Conditions are obtained under which the existence of solutions of this operator equation follows from the solvability of the “model” equation. Conditions for the stability of the solutions under small variations in the mapping \( G \) are established. The statements proved in the present paper extend the Kantorovich fixed-point theorem for differentiable mappings of Banach spaces, as well as its generalizations to coincidence points of mappings of metric spaces.

MSC:
47Bxx Special classes of linear operators
65Jxx Numerical analysis in abstract spaces
47Axx General theory of linear operators
47-XX Operator theory

Keywords:
equation in metric space; existence of a solution; stability; coincidence point; fixed point

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References:

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