AN INDUCTION THEOREM AND NONLINEAR REGULARITY MODELS
WITH APPLICATION TO OPTIMALITY CONDITIONS

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Abstract. A general nonlinear regularity model for a set-valued mapping on metric spaces, is studied using special iteration procedures, going back to Banach, Schauder, Lyusternik, and Graves. Namely, we revise our induction theorem from [J. Math. Anal. Appl., 118 (1986), pp. 519–534] and employ it to obtain basic estimates for exploring regularity/openness properties. We also show that it can serve as a substitution for the Ekeland variational principle when establishing other regularity criteria. Then, we apply the induction theorem and the mentioned estimates to establish criteria for both global and local versions of regularity/openness properties for our model and demonstrate how the definitions and criteria translate into the conventional setting of a set-valued mapping. An application to second-order necessary optimality conditions for a nonsmooth set-valued optimization problem is provided.

Key words. metric regularity, induction theorem, Ekeland variational principle, optimality conditions

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