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On the Lavrentiev Regularization of the Ill-posed Data Completion Problem

The Lavrentiev regularization method is naturally fitted to the data completion problem, put under the variational form proposed in Ben Belgacem and El Fekih (Inverse Problems, 2005). We address the important issue of selecting the regularizing parameter. We study an a priori choice and the a posteriori choice by means of the discrepancy principle written on the Kohn–Vogelius function. In both cases, we prove that the Lavrentiev method, though its simplicity, is *super-convergent* as we state estimates similar to those expected for Tikhonov's method.