EXTREMAL LENGTH AND FUNCTIONAL COMPLETION

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Introduction

The present study arose from an attempt to characterize structurally the completion of certain classes of functions connected with vector analysis and partial differential equations. As examples may be mentioned the class of irrotational vector fields or of solenoidal vector fields, the class of Beppo Levi functions (characterized by a finite Dirichlet integral), or the graph of a system of linear first order partial differential operators with constant coefficients. The completion refers to an L^p-metric, $p \geq 1$, and takes place within a given region X in Euclidean n-dim. space R^n. Restricting the attention to sufficiently differentiable functions or vector fields, one may characterize the classes in question by certain classical relations involving integration