Exponential Penalty Approach for Multi-dimensional Vvariational Problem with Inequality Constraints

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Abstract

In this article, we describe a method to deal with a multi-dimensional variational problem with inequality constraints using an exponential penalty function. By utilizing the exponential penalty function, we formulate an unconstrained multi-dimensional variational problem and examine the relationships between the optimal solution to the considered multi-dimensional variational problem and the sequence of minimizers of the unconstrained multi-dimensional variational problem. The convergence of the proposed exponential penalty approach is also investigated, which shows that a convergent subsequence of the sequence of minimizers of the unconstrained multi-dimensional variational problem approaches an optimal solution to the multi-dimensional variational problem. Further, an illustrative application (to minimize a manufacturing cost functional of a production firm) is also presented to confirm the effectiveness of the proposed outcomes.

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