Global Optimization of Costly Functions using Radial Basis Functions*

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Abstract

For the global optimization of costly non-convex objective functions, Powell [1] (1998) has suggested the use of radial basis functions (RBF) to interpolate the function values so far computed. Based on this idea Gutmann [3] (1999) presented an interesting RBF algorithm.

We discuss an improved RBF algorithm, implemented in Matlab using the TOMLAB optimization environment [4]. Our results on the Dixon-Szegö test set [5] are very good compared to the results published for the DIRECT [6], EGO [7] and MCS [8] algorithms, as well as for the RBF algorithm of Gutmann. The algorithm has with great success been applied on a costly industrial problem; the design of a passenger train (optimizing the carbody and bogie masses, vibration frequencies etc.), where each function value is the result of a complicated simulation of the train ride.

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