A DIMENSIONALITY REDUCTION PRINCIPLE
ON THE OPTIMIZATION OF FUNCTION

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Abstract. In this paper, we put out a dimensionality reduction principle on the optimization of function, in other words, we show that $\inf_{a \in \mathbb{R}_+^n} \{f(a)\} = 0$ if and only if

$$\inf_{a \in [0,1]^m, k \in K_{m+1}} \left\{ f\left(a_1 I_{k_1}, \ldots, a_m I_{k_m}, I_{k_{m+1}}, O_{n-k_1-\cdots-k_{m+1}}\right) \right\} = 0$$

under the proper hypotheses. As applications, we study the optimal problems of linear inequalities involving function power means. In order to show the significance of our results, we give an example for a discrete case by means of the software Mathematica and another example involving space science.

Mathematics subject classification (2010): 26D15, 26E60.

Keywords and phrases: optimization, dimensionality reduction principle, function power mean, θ-average gravity norm.

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