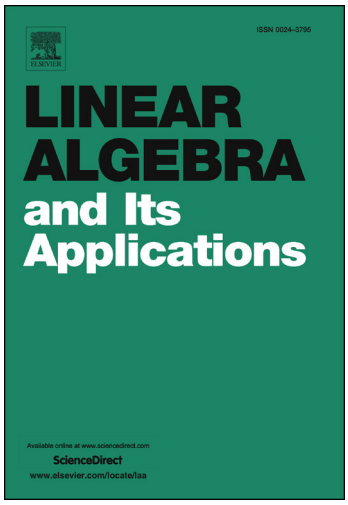

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Characterizations of Minimal Elements of Topical Functions on Semimodules with Applications

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Abstract. In this paper, we first give characterizations of the superdifferential of extended valued topical functions defined on a semimodule with values in a semifield. Next, we characterize minimal elements of the upper support set of extended valued topical functions. Finally, as an application, we present a necessary and sufficient condition for global maximum of the difference of two strictly topical functions defined on a semimodule.

Key words: semifield, semimodule, minimal element, topical function, support set, b-complete, superdifferential, DC-functions, global optimization.

2010 (AMS) Mathematics Subject Classification: 06F25, 06F30, 26A48, 90C46.

1 Introduction

Topical functions have arisen in several contexts, and the term "topical function" is due to Gunawardena and Keane [11]. Topical functions are intensively studied (see [8, 9, 10] and the references therein) and they have many applications in various parts of applied mathematics, in particular, in the modelling of discrete event systems (see [9, 10]).

Topical functions are also interesting from a different point of view, namely as a tool in the study of the so-called downward sets. Downward sets arise in the study of some problems of mathematical economics and game theory and also in the study of inequality systems involving increasing functions (see [21]).

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