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3.3 Variable ordering structures – what can be assumed?

Gabriele Eichfelder (TU Ilmenau, DE)

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In some real-world applications in multi-objective optimization it cannot be assumed that there is a partial ordering in the image space, i.e. that there exists a binary relation which is reflexive, transitive and compatible with the linear structure of the space. Instead, preferences may vary depending on the current information. This can be modeled by an ordering map which associates sets of improving (or deteriorating) directions with each element of the image space or of the pre-image space. Depending on the point of view (i.e. preference or domination) different optimality concepts are discussed in the literature. In this talk we give some motivating applications and a basic introduction to this topic. We present the various ways given in the literature to model a variable ordering structure and the different optimality concepts which are derived. We collect some basic properties which are often assumed for obtaining theoretical and numerical results. Limitations of the current concepts are also pointed out. This talk aims to be the base for a discussion on how variable ordering structures can be modeled, which assumptions on an ordering map seem to be reasonable, and which optimality concepts are considered to be most practically relevant.