SEMINÁRIO

19 de Setembro de 2008
(Departamento de Matemática, sala Sousa Pinto, 11:30-12:30)

Título: Multiple Objective Linear Fractional Programming Problems.

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Resumo: The main reason for the interest in and importance of fractional programming stems from the fact that various problems, ranging from engineering to economics, consider the optimization of a ratio between physical and/or economic linear functions. In many linear applications, for example, the programming models could better fit the 'real problem' if we used linear fractional goals. The explicit use of several criteria or objectives can also make a model to better fit most decision situations where several conflicting, or at least different, points of view have to be considered. These situations usually need not only mathematical tools and techniques to support the determination of one solution (or a small set of solutions), but they also need some decision aid in order to help elicit the decision maker's (DM) preferences. Interactive methods are usually chosen to support both these needs, when a multiobjective linear programming (MOLP) problem is used to model the decision situation. Using some branch and bound techniques, Costa (2005) has developed a new interactive method for MOLFP that drastically reduces the computational effort needed, while providing guidance for the decision maker in the choice of his/her preferred solutions. This method and the software (Lourenço and Costa, unpublished) supporting it will be presented. A technique (Costa, 2007) to compute the maximum of a weighted sum of the objective functions in MOLFP will also be presented The basic idea of the technique is to divide (by the approximate 'middle') the non-dominated region in two sub-regions and to analyze each of them in order to discard one

if it can be proved that the maximum of the weighted sum is in the other. The process is repeated with the remaining region. The process will end when the remaining regions are so little that the differences among their non-dominated solutions are lower than a pre-defined error. Through the discarded regions it is possible to extract conditions that establish weight indifference regions. These conditions define the variation range of the weights that necessarily leads to the same non-dominated solution. Software to compute the non-dominated solutions and the weight indifference regions will be presented. Reference points can also be used to compute non-dominated solutions in MOLFP. A technique and the software to support it will be presented (Costa and Alves, accepted).

Referncias:

- Costa, João and Alves, Maria (accepted) A Reference Point Technique to Compute Non-Dominated Solutions in MOLFP, Journal of Mathematical Sciences.
- Costa, João (2005) An interactive method for multiple objective linear fractional programming problems, OR Spectrum, nž 27, pp 633-652.
- Costa, João (2007) Computing non-dominated solutions in MOLFP, European Journal of Operational Research, nž 181, 1464-1475.
- Costa, João (2007) A branch & cut technique to compute non-dominated solutions in MOLFP, Proceedings of the 7th International Conference on Optimization: Techniques and Applications (ICOTA7), 2007, Kobe, Japan.
- Lourenço, João and Costa, João (unpublished) InterFractional: a computational tool implementing an interactive method in multi-objective linear fractional programming.