

## Semi-infinite air pollution control problems

A. Ismael F. Vaz<sup>1</sup>; [aivaz@dps.uminho.pt](mailto:aivaz@dps.uminho.pt)

Eugénio C. Ferreira<sup>2</sup>; [ecferreira@deb.uminho.pt](mailto:ecferreira@deb.uminho.pt)

<sup>1</sup> Departamento de Produção e Sistemas, Escola de Engenharia, Campus de Gualtar, Universidade do Minho, 4710-057 Braga, Portugal

<sup>2</sup> Centro de Engenharia Biológica, Campus de Gualtar, Universidade do Minho, 4710-057 Braga, Portugal

### Abstract

Semi-infinite programming (SIP) problems arise in many engineering areas. Robot trajectory planning and optimal signal sets are two fine examples. Air pollution abatement problems, which are linear SIP problems, were proposed in the seventies by Gustafson and Kortanek [Analytical properties of some multiple-source urban diffusion models, *Environment and Planning* **4**, pp. 31-41, 1972].

Recent available tools for non-linear SIP allow the formulation of more general air control problems, namely the optimum stack design.

In the air control SIP problem an objective function is to be optimised (minimum stack height or minimum cleaning costs), where the air pollution, at ground level, is kept bellow a given threshold. A Gaussian model is used to provide estimates of air pollution in a region where mean weather conditions are assumed.

In this talk, we present three formulated air pollution control problems coded in the (SIP)AMPL modelling language and numerical results obtained with the discretization method of the NSIPS solver.

---