

A LINEAR PROGRAMMING MODEL FOR CONTROLLING AIR POLLUTION

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Abstract: A three-dimensional dispersion air pollution model with point sources is considered in a limited region. The adjoint model and the duality principle are used to pose a linear programming problem with the aim to determine optimal emission rates of the sources and meet the standards of air quality. The existence of the optimal control problem solution is proved. An interior-point method and the simplex method are used to approximate the optimal solution. Numerical results obtained in the case of point sources demonstrate the method's ability.

AMS Subject Classification: 49J20, 90C05, 62P12

Key Words: dispersion model, adjoint model, linear programming, optimal control

1. Introduction

Air pollution problems exist at all scales from extremely local to global. On each scale the air pollution events have different features determined by the form, location and intensity of the pollution sources, the type of substances emitted into the atmosphere and the atmospheric dispersion conditions such as the wind and turbulence [18]. Due to all these factors, the primary and

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