

Positive Schemes for Air Pollution Problems, Optimal Location of Industrial Enterprises and Optimization of their Emissions

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Abstract: Environmental problems are becoming more and more important for our world and their importance will even increase in the future. High pollution of air, water and soil may cause damage to plants, animals and humans. Therefore, the development of industry must be coupled with the protection of the environment, especially in fast-growing countries like Vietnam.

In this talk we deal with the numerical solution of some problems of air pollution. Since the problems are posed on unbounded domains we have to introduce artificial boundaries to confine the computational region. We construct and analyse (discrete) transparent boundary conditions for an implicit difference scheme. We discuss the concepts of positivity and monotonicity of difference schemes and briefly consider these properties of difference schemes for advection–diffusion equations arising in problems of air (and water) pollution.

In the second part of the talk we shall consider the problems of optimal location of industrial enterprises and optimization of emissions from enterprises for ensuring sanitary environment criteria to protect sensitive areas like densely populated areas, recreation zones, water reservoirs, etc. Moreover, we study the problem of determination of the coefficients of diffusion and the coefficient of transformation of aerosols. Several numerical experiments illustrate the efficiency and accuracy of the presented methods.

References

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