An Effective and Efficient Method for the Environmental Impact Assessment of Thermal Power Plants and Future Acidic Deposition in Japan under Some Emission Control Scenario in East Asia

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The law for environmental impact assessment was enforced in Japan in 1999. Consequently, the need for an effective and efficient method to predict the atmospheric dispersion of air pollutants, particularly for evaluating topographical effects on exhaust gas dispersion, has increased because Japanese topographical features are complex. The effects of topography on exhaust gas dispersion have been conventionally evaluated by means of wind tunnel experiments. The use of an atmospheric dispersion model would be superior to wind tunnel experiments in terms of cost and evaluation time. An atmospheric dispersion model was developed for the environmental impact assessment of thermal power plants and a method for evaluating topographical effects using this model was proposed. The validity of the method was confirmed on the basis of the results of wind tunnel experiments for a real terrain and field tracer experiments. The atmospheric dispersion model enabled us to evaluate topographical effects with the same accuracy as and at lower cost than wind tunnel experiments.

In the 1990s, world attention focused on acid rain in East Asia, whose energy demand is expected to increase substantially owing to economic expansion and population growth. The monitoring of acidic deposition in East Asia and the analysis of the long-range transport of air pollutants under the present conditions advanced. In 1998, a number of experts gathered together and launched the MICS-ASIA project (model-intercomparison study of long-range transport and sulfur deposition in East Asia). At present, environmental impact assessment of acid rain requires that we forecast future acidic depositions for various energy consumption and emission control scenarios. Future acidic depositions in Japan were forecasted using the CRIEPI long-range transport model. If current and future legislations are observed according to plan, the emission of primary precursors to acidity (sulfur and nitrogen oxides) from East Asia would increase and in the year 2030 would be about 30-50 percent higher than in 1995. Acidic deposition in Japan would increase by approximately 20 percent and the pH value would decrease by approximately 0.1from 1995 to 2030. It is anticipated that an increase in acidic depositions of this extent would have no serious impact on Japan, but if the emission of precursors on the continent continue increasing as at present, it could bring about environmental deterioration in various Asian countries.