

4th International Conference on **Pollution Control & Sustainable Environment**
&
6th Edition of International Conference on **Water Pollution & Sewage Management**
July 26-27, 2018 Rome, Italy

A proposal of objective analysis method on environmental sea temperature for evaluation of warm water dispersion discharged from power plants

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In Japan thermal and nuclear power plants have been generally constructed in coasts to use a plenty of sea water for a cooling system of vapor, and warm water is discharged again into the surrounding seas. Then the evaluation of dispersion of warm water is one of the important issues for an environmental impact assessment (EIA) and for environmental monitoring under operation of power plants. Therefore the dispersion area of warm water is decided relatively against the environmental sea temperature as a reference, the decision of environmental sea temperature is essential in the evaluation process. A new analysis method using an optimal interpolation on environmental sea temperature, which can take account of spatial non-uniformity of environmental sea temperature, is proposed for the EIA and environmental monitoring of warm water. As the result of applying the proposed method to the environmental survey data with a thermal power plant where warm water is discharged as surface buoyant jet, the optimal correlation length, the important parameter of optimal interpolation, is estimated about one and a half times of maximum distance between observational points. In addition, the enclosed area of 2°C higher dispersion area of warm water according to the preliminarily prediction based on such as numerical simulations is found to be adequate criteria for selection of the observational data to be analyzed. Finally, the estimated dispersion area of warm water in the surface based on the proposed method is certified to be consistent with the result of the EIA.

Biography

Shin'ichi Sakai has and received his Doctor of Engineering degree titled: Study for coastal current analysis with remote sensing data and data assimilation method, from Kyoto University. He has started the career of Research Scientist at Central Research Institute of Electric Power Industry in 1989 and now is in charge of coastal environmental issues as a Senior Research Scientist.

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