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A GREY SYSTEM MODEL FOR PREDICTING TREND CHANGE OF URBAN WASTE WATER LOAD

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ABSTRACT

The present paper introduces a Grey System Prediction Model (GSPM) by incorporating concepts of grey numbers within a grey differential equation framework as a means for predicting trends in urban waste water load under uncertainty. A new operation law of grey numbers was developed that overcomes some of disadvantages of present interval operations. In the light of these operation principles, the original grey differential equation can be reduced to two equivalent sub-models. One is whitening or averaged value system equation that is equivalent to the GM(1,1) prediction model in grey system theory. Another is a grey radius equation, expressing system uncertainty. The GSPM approach improves upon previous prediction models by allowing uncertainty information to be directly communicated into the grey series modeling and prediction. The method also does not lead to more complicated models, and is applicable to practical problems. The GSPM approach has been applied to trend change prediction of waste water load in Luo Yang City, He Nan Province, China. Preliminary examinations indicate that reasonable solutions can be generated. Besides trend change information, the grey system model could provide the degree of uncertainty of model parameters and output variables.

Reference: Xia, J. and B. Hu; A Grey System Model for Predicting Trend Change of Urban Waste Water Load, Journal of Environmental Hydrology, Vol. 5, Paper 2, 1997.

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