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Application of Adaptive Neural Network Algorithms for Determination of Salt Composition of Waters Using Laser Spectroscopy

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Abstract : In this study, a comparative analysis of the approaches associated with the use of neural network algorithms for effective solution of a complex inverse problem – the problem of identifying and determining the individual concentrations of inorganic salts in multicomponent aqueous solutions by the spectra of Raman scattering of light – is performed. It is shown that application of artificial neural networks provides the average accuracy of determination of concentration of each salt no worse than 0.025 M. The results of comparative analysis of input data compression methods are presented. It is demonstrated that use of uniform aggregation of input features allows decreasing the error of determination of individual concentrations of components by 16-18% on the average.

Keywords : inverse problems, multi-component solutions, neural networks, Raman spectroscopy
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