

Abstract

Iman Gamal Morsi

Measuring, Modeling Water Quality by Using Sensors and Statistical Analysis Techniques

Water quality is measured based on the study of several parameters for different water sources. Three different sources of water are studied in Alexandria (Egypt): Mediterranean Sea, Mariot Lake, and mineral water. The measured parameters are: Sodium (Na), Magnesium (Mg), Calcium (Ca), Nickel (Ni), in addition to pH, conductivity, and temperature. The measured values are compared with the standard of water parameters given by the World Health Organization (WHO). Different devices and sensors are used in measurements which are: ICP-7500 sequential plasma Spectroscopy SHIMADZU, ASTM D1126-02, ASTM D5708-11, ASTM D4191-08, ASTM D1125-95, ASTM D4191-08, ASTM D1293-99, in addition to colorimetric and potentiometric sensors. The linear regression model based on these parameters is extracted, and the coefficients are calculated by using three statistical analysis methods namely: regstat, rounstfit, and curve fitting. The predicted values of the concentrations from the linear regression models are compared with the measured values, and the root mean square error (RMS) is calculated. The principal component analysis (PCA) method is applied for clustering the three sources of water according to the values of measured parameters. The results indicate that, Mediterranean Sea is recommended as an alternative source. Mariot Lake is contaminated to a high degree.