

# **Abstract**

**Akram S Soliman**

## **Engineering approach to increase the rate of water exchange between Eastern Harbour and Mediterranean Sea, Alexandria, Egypt**

The Eastern Harbour in Alexandria City suffered, and is still suffering from environmental problems. For many years till the year 2003, this harbour was receiving the sewage disposal of the central part of Alexandria city. Many studies were conducted to evaluate the water pollution in this harbour, and the results indicated that it has a low levels of dissolved oxygen, and it is highly polluted with nitrates, nitrites, bacteria and chlorophyll-a. The objective of this study is to find practical engineering solutions to increase the rate of water exchanges between the Eastern harbour and the Mediterranean Sea in order to decrease the pollution of the harbour waters. Two different engineering approaches were suggested and studied in this research, the first method depends on increasing the amount of wave overtopping over the harbour breakwaters, and the other deals with increasing the amount of water exchange using submerged pipes across the breakwater body. Using the classic equations, it was demonstrated that the rate of water exchange using the first method is considerably higher than that demonstrated the second method. Moreover, the wave overtopping method is more practical and more economical than the submerged pipelines method.