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## **NAČRTOVANJE RAZVOJA VODOVODNIH SISTEMOV Z UPORABO GENETSKIH ALGORITMOV**

### **Povzetek**

V današnjem času se tudi na področju vodenja sistemov za oskrbo z vodo vse bolj uporabljajo napredna orodja. Z njimi se skuša zajeti tako uspešno poslovanje službe, ki je zadolžena za vodenje, kakor zagotoviti nemoteno oskrbo z vodo. Za doseg takih ciljev, pri katerih je treba iskati optimalno rešitev med ekonomskimi, pravnimi in tehničnimi kriteriji, smo uporabili orodje imenovano genetski algoritmi. Nalogo smo izvedli na stvarnem manjšem, vendar kompleksnem vodovodnem sistemu. Na vzpostavljenem umerjenem hidravličnem modelu smo izvedli analizo možnih posegov, s katerimi bi zagotovili dolgoročno nemoteno oskrbo z vodo s čim manjšimi spremljajočimi stroški. Med delom smo razvili orodje, ki temelji na programski opremi EPANET in za optimizacijski del uporablja genetski algoritem. To nam je omogočilo napredno analizo trenutnih obratovalnih razmer vodovodnega sistema in iskanje optimalne rešitve med možnimi razvojnimi rešitvami. ...

**Ključne besede:** sistemi vodovodni, algoritmi genetski, optimiranje sistemov, modeliranje hidravlično

## **GENETIC-ALGORITHMS-SUPPORTED PLANNING OF WATER-SUPPLY SYSTEMS**

### **Abstract**

The present-day water supply services use advanced technologies in order to provide their customers with constantly improving services. This involves the adoption of a pro-active approach to the operational management of distribution networks as a means of improving customer satisfaction. As a result, an analysis of the necessary changes in the network management and the operations, and their effects on customers, along with the reduction of operating costs and investments, was performed with optimisation tool called genetic algorithms. This paper presents work performed on a small but complex, water-supply system. The work comprised building a model, model calibration, and an analysis of the development perspectives to ensure the long-term coverage of customer needs, while taking into account the limited resources available. During the work some tools were developed, based predominantly on the EPANET software, which uses genetics algorithms as an optimisation procedure. This enabled an advanced analysis of the existing performance of the water-supply system as well as an analysis of the different development options.

**Key words:** water supply systems, genetic algorithms, systems optimization, hydraulic modelling