



Код: 10898

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A Global Approach for Detection of Leaks in Closed-Loop Water Distribution Networks

Дрезден, Германия, 2012 год

8 стр; формат: 23,5 x 16 см; библиографический список: 8 единиц

The problem of leak detection is important from the industrial (increasing cost of water distribution) and environmental (diminishing water resources) point of view. Researchers representing various disciplines are involved in both theoretical and practical aspects of the problem trying to give it a holistic treatment, which should eventually lead to an implementation in the field.

This paper deals with an interdisciplinary transfer of ideas from structural mechanics to hydraulic engineering using analogies between truss structures and water distribution networks and the graph representation of both systems. The problem of hydraulic system modelling and leakage identification was formulated and solved at steady-state flow within the framework of the Virtual Distortion Method (VDM) - a method of fast reanalysis.

Доклад. 6-я Европейская конференция по мониторингу технического состояния сооружений, 2012. Редакция Кристиана Боллера.

Ключевые слова:

Содержание

Abstract

Introduction

Analogies between mechanics and hydraulics

Formulation of the leak problem

Precise detecton of leak along branch

Measuring pressure at arbitrary points

Account for non-linear constitutive law

Influence of data noise on identification results

Conclusions

Acknowledgements