RAZVOJ OPTIMIZACIJSKOG MODELA ZA PROJEKTOVANJE INTEGRALNOG SISTEMA VODE U PROCESNOJ INDUSTRIJI

SAŽETAK

Ušteda vode u procesnoj industriji je jedan od primarnih ciljeva kako sa ekonomskog tako i sa aspekta zagađenja okoline. To se naročito odnosi na procese koji troše velike količine vode.
U radu su predstavljene dvije metode za uštedu vode: Water pinch i matematičko programiranje. Water pinch je grafička metoda, dok se matematičko programiranje zasniva na optimizaciji superstrukture. Cilj ovog rada je razvoj optimizacijskog modela za projektovanje integralnog sistema vode u procesnoj industriji. Model je programski razvijen u GAMS-u i testiran na ilustrativnim primjerima, u cilju utvrđivanja minimalne potrošnje svježe i generisanja otpadne vode. Testiranjem različitih primjera je ustanovljena značajna ušteda vode razmatranjem integralnih sistema za mreže vode u odnosu na parcijalne sisteme procesnih i tretman jedinica.

Ključne riječi:

- Water Pinch tehnologija
- Matematičko programiranje
- Projektovanje mreža vode
- Procesna integracija
- Optimizacija procesa

OPTIMIZATION MODEL DEVELOPMENT FOR THE DESIGN OF INTEGRATED PROCESS WATER NETWORKS IN PROCESS INDUSTRIES

ABSTRACT

Water conservation in process industries is one of a primary goals considering economical and environment pollution aspects. That is especially important in the processes that consume large quantities of water. In this paper two methods for the water conservation are presented:
Water pinch and mathematical programming. Water pinch is graphical method whilst mathematical programming is based on a superstructure optimization. The goal of this paper is to develop optimization model for the design of integrated process water networks in process industries. The programming code was developed in GAMS and tested on variety of examples to determine minimal fresh water consumption and wastewater generation. It is shown that significant water conservation can be achieved only by considering integrated water networks instead of partial.

Key words:

- Water Pinch tehnology
- Mathematical programming
- Water network design
- Process integration
- Optimization of processes