

An iterative optimisation procedure for the rehabilitation of water-supply pipe networks

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Abstract

This paper presents an iterative method for the optimisation of the total costs for the rehabilitation of water-supply pipe networks with flow and pressure deficiency at the consumer nodes. The procedure is based on the exchange gradient concept of Granados for the economic design of pressurised networks. The substitution of pipe sections, relining and increase in pumping head are considered as being rehabilitation options. An initial solution is obtained for the deficient network by determining the required pumping head that would meet the pressure and discharge requirements at all the nodes. Subsequently, the pumping head is reduced in stages and for each reduction; the network of minimum cost is obtained by the substitution or relining of individual pipes in part or in full. The optimal solution is reached when the marginal annual cost of pipe rehabilitation exceeds the reduction in annual pumping costs.

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