Optimization of Dead End Water Distribution Systems

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Document Type: Journal Paper

Abstract:
A single dead end system with multiple withdrawals has been synthesized. Dead end water distribution systems are frequently encountered in rural water supply systems. Their optimal design is reduced to a nonlinear objective function with a nonlinear constraint. A closed form solution of the problem has been obtained by the Lagrangian multiplier method. The solution is presented in a form directly usable by the design engineer providing optimal pipe diameters, pumping head, hydraulic gradient line, and the minimal cost. The solution has been generalized for a continuous withdrawal of discharge. The case of two withdrawals is depictable in graphical form and provides a clear insight into the variation of the various parameters. Substantial saving can be achieved by designing the water distribution facilities at minimal costs.

Subject Headings: Water supply systems | Hydraulic design | Rural areas | Closed form solutions | Lagrangian functions | Pipelines | Pumps | Head (fluid mechanics)

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The issue with dead ends is that there is not enough flow and the water becomes stagnant and the chlorine residual drops. This can lead to a bad taste in the water or a risk that the water is not adequately chlorinated. An easy fix is just to install another smaller main (say 4” or 6” main) and “loop” it to the dead end main. 860 Views · View 2 Upvoters. Related Questions. How does the water distribution system work? What is new research on the water distribution system? Can we design a water delivery system throughout the country to equalize distribution of water? How does water distribution