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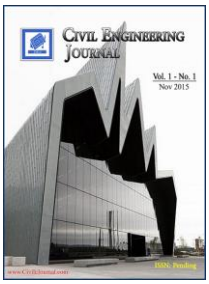

Designing Manhole in Water Transmission Lines Using Flow3D Numerical Model

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Abstract

Using cascades and drops existing in flow path has a history of 3000 years. Particularly, Roman engineers employed stepped spillways with the same idea in several countries; however, there are few information about the hydraulic performance of aqueducts. Most of these channels have flat long cross sections with low torsions (variable slope) such that they can encompass cascade and steep spillways or dopshaft. Given that there are few studies conducted on dropshafts, the present paper attempted to discuss about such structures in flow path and water transmission lines as well as introducing the existing principles and relations and present, the obtained results of designing though Flow3D. The obtained error percentage was about 20% which is acceptable for numerical studies.

Keywords: Drop manhole, Vertical shaft, Projectile, Finite volume, Flow3D.

1. Introduction

In studies related to Roman structures, cost and time of implementing projects depended on various issues such as tunnels, piers, arcades, raised foundations, and siphon. Roman projects have been completed during 3 to 15 years with an average cost of 23 to 69 million dollars each kilometer. Their structures have been designed for low discharge flows (0.2-2 m^3/s) and low longitudinal slopes (about 1-3 m each kilometer, on average) [1-4]. Their studies include the three following areas:

- Smooth sharp shots
- Stepped channels
- Cascades and dropshafts

Using the third alternative (dropshaft) as the main branch of their channel requires a certain science of engineering and is considered as new designs. Hydraulically, dropshafts includes the followings:

- The possibility of implementing vertical drop in balance of trade
- Kinetic energy dissipation of fluid flow
- Flow aeration

In the first case, dropshaft will allow the relation between two flat channels which are placed in various trades in a very short distance from each other. The second case of these structures' uses is kinetic energy dissipation of fluid flow which is used to optimize the performance of structures and prevent scouring and erosion of downstream

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