

AFRICON, 2017 IEEE, Cape Town, South Africa, 18-20 September 2017

Burst leakage-pressure dependency in water piping networks: Its impact on leak openings

Adedeji KB; Hamam Y; Abe BT; Abu-Mahfouz; AM

Abstract:

In most water distribution systems, an appreciable volume of water is lost through leaking pipes, resulting in financial loss and environmental pollution among others. Thus, water loss constitutes a major challenge to utilities around the world. As water pressure is one of the causes of pipe burst resulting into leakages, pressure control could reduce the possibilities of pipe bursts. Thus, water utilities are keen on reducing the network pressure (to reduce leakages) while still maintaining the necessary pressure to fully satisfy customer demands. In this paper, the effect of pressure-bursts leakage dependency on leaks opening in water pipes using Torricelli mathematical model is investigated. Four different pipe leak openings of circular, rectangular, square and triangular geometries are simulated. Likewise, the probability of pipe breakage/burst due to pressure variations are investigated. The simulation results show that the effect of pressure variation is more pronounced on leak openings with rectangular geometry. Additionally, the characteristic nature of this leakage to pressure dependency is examined. The results also reveal the importance of pipe diameter inclusion in any leakage model. Small diameter pipes are more exposed to pipe burst as the pressure increases.