

## Mathematical Modeling Pressure Losses of Trapezoidal Labyrinth Channel and Bi-Objective Optimization of the Design Parameters

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**Abstract :** The influence of the geometric parameters of trapezoidal labyrinth channel on the pressure losses along the labyrinth length is investigated in this work. The impact of the dentate height is studied at fixed values of the dentate angle and the dentate spacing. The objective of the work presented in this paper is to derive a mathematical model of the pressure losses along the labyrinth length depending on the dentate height. The numerical simulations of the water flow movement are performed by using Commercial codes ANSYS GAMBIT and FLUENT. Dripper inlet pressure is set up to be 1 bar. As a result, the mathematical model of the pressure losses is determined as a second-order polynomial by means Commercial code STATISTIKA. Bi-objective optimization is performed by using the mean algebraic function of utility. The optimum value of the dentate height is defined at fixed values of the dentate angle and the dentate spacing. The derived model of the pressure losses and the optimum value of the dentate height are used as a basis for a more successful emitter design.

**Keywords :** drip irrigation, labyrinth channel hydrodynamics, numerical simulations, Reynolds stress model

**Conference Title :** ICIWMIE 2018 : International Conference on Irrigation Water Management and Irrigation Efficiency

**Conference Location :** Paris, France

**Conference Dates :** April 19-20, 2018