Abstract

Flooding has been a problem for a long time, especially after heavy rains. Channels constructed to lessen floods are used to move water into rivers, lakes, and the ocean. Engineers have been faced with the challenge of designing drainage ditches, irrigation canals, and navigation channels while making use of hydraulic efficiency to move as much water as possible in order to generate energy. The bulk of studies on open channels have focused on rectangular, parabolic, trapezoidal, and circular channels, leaving a knowledge gap that has to be filled. Less research has been done on channels that resemble horseshoes and have lateral inflows. Modeling a homogeneous flow in Zone 2 with a horseshoe-shaped cross-section and lateral inflows is the goal of this study. The study's goal was to ascertain how changes in the lateral inflow channels' area and an increase in the lateral inflows' length in zone 2 impact the main channel flow velocity. The physical circumstances of the flow issue were applied to the conservation equations in order to get the governing equations. These equations were solved using the finite difference approximation method because of its accuracy, stability, and convergence. The investigation's results were displayed graphically. The investigation found that when the cross sectional area reduces, the main channel's velocity increases. In the end, as the area of the lateral inputs reduces, so does the main channel's velocity. Flood mitigation and water collection for irrigation push the boundaries of science, technology, and engineering by requiring innovative solutions and climate change-tolerant infrastructure that increase crop yield and resilience.