Modeling fluid flow in open channel

with circular cross – section

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ABSTRACT

Flow in a closed conduit is regarded as open channel flow, if it has a free surface. This study considers unsteady non-uniform open channel flow in a closed conduit with circular cross-section. We investigate the effects of the flow depth, the cross section area of flow, channel radius, slope of the channel, roughness coefficient and energy coefficient on the flow velocity as well as the depth at which flow velocity is maximum. The finite difference approximation method is used to solve the governing equations because of its accuracy, stability and convergence followed by a graphical presentation of the results. It is found that for a given flow area, the velocity of flow increases with increasing depth and that the velocity is maximum slightly below the free surface. Moreover, increase in the slope of the channel and energy coefficient leads to an increase in flow velocity whereas increase in roughness coefficient, flow depth, radius of the conduit and area of flow leads to a decrease in flow velocity.