

عنوان مقاله:

Numerical Simulation of the effect of the Pile and Foundation Geometries on the Local Scouring Around the Inclined Pier Group with the FLOW-3D Software

محل انتشار:

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خلاصه مقاله:

When the bridge piers are located in front of the water flow, vortices are formed against it and due to their activity, the materials of the river bed are eroded around the bridge piers and the scouring hole is created. If the foundation depth and bridge pier piles are insufficient, the bridge will fail. In this research, due to the importance of identifying the mechanisms affecting the scouring on this types of bridge piers, the effect of the geometric shape of the piles installed under the inclined piers and also the effect of the pile cap leveling in the sedimentary bed have been investigated and the properties of the scouring around the inclined pier group was studied numerically using the FLOW-3D software. The study of total shear stress in the flow bed at different leveling of the pile caps shows that the highest shear stress is created when the pile cap position is at the same level as the river bed; by installing the pile cap at a lower level than the river bed, the maximum shear stress decreases. This may be due to the fact that in this case, the distance between the pier group increases and the presence of the second pier decreases the flow rate in the pier group and different pier in the one pier group acts as the two independent piers in the formation of the flow pattern. By comparing the final longitudinal sections of the scouring at different leveling of the pile cap, it is concluded that the largest reduction in scouring depth occurs in aerofoil-shaped pile caps and pile caps with the sharper nose and better aerodynamic shapes are good options to control the horseshoe vortices and will reduce the scouring depth around the inclined pier group.

کلمات کلیدی:

Scour, Flow pattern, Crop processing digits, Pile geometry shape, Inclined pier group, FLOW-3D

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