**Comparison of absorption capacity through open channels with different irreversible-boundary types**

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The problem of wastewater treatment has drawn much attention, different measurements have been taken to improve the absorption capacity within open channels, such as floating vegetation islands and irreversible beds. However, even with a certain boundary-absorption intensity, the capacity of pollution absorption within the whole open channel would be varied due to the variation of velocity structure and contaminant transport process affected by different boundary conditions, such as top absorption boundary or bed absorption boundary. Thus, to find out the better measurement for water treatment, the comparison for absorption intensity with different types of irreversible boundaries is studied in this work. The multi-scale analysis is applied in this work to study the contaminant transport process within open channels with different boundary types. With a certain absorption intensity, the contaminant cloud expansion area, the position of contaminant cloud centroid are studied to express the differences of contaminant cloud features with different boundary conditions. Moreover, absorption efficiency along the stream direction and the residual mass are discussed to study the total pollution absorption capacity under the top absorption boundary and the bottom absorption boundary separately. Figuring out differences of absorption capacity and contaminant cloud expansion under different irreversible-boundary types are two major issues in our work, which can provide strategies for water treatment.