BED CHARACTERISTICS IN 180° CHANNEL BEND WITH LATERAL DIVERSION

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The mechanics of sediment transport in channel bends, frequently appearing in natural rivers, is much more complex than that in straight channels. Channel bends with fixed bed as well as movable bed; have been extensively investigated both theoretically and experimentally.

Little information is available about lateral diversion in river bend. Shafai Bajestan and Nazari (1999) studied the effect of diversion angle on the amount of sediment transported to the lateral diversion. Review of literature shows that the bed changes in channel bend due to lateral diversion have not been studied so far. In this paper, information regarding bed changes is obtained experimentally under steady condition with movable bed.

Experiments were conducted in a re-circulating flume having a central angle of 180°. Experiments were carried out until the condition of equilibrium bathymetry was observed, Figs 1 show typical bed topography for discharge Q=40 l/s, flow depth h=13.6 cm for t= 2 hours after beginning of experiment. It is clear that the crest of bed forms is inclined toward the inner bank.

Fig. 2 shows the typical bed topography of channel bend with lateral diversion for equilibrium condition. The most obvious feature of the bed topography is the formation of point bar along the inner bank, and the relatively deep scour hole along the outer bank. This observation agrees qualitatively with the laboratory data for bend without lateral diversion reported by Odgaard and Bergs (1988).

A typical variation of transverse bed profile is shown in Fig. 3. At the beginning, the rate of bed deformation is very high. Because there was not counteracting to the effect of driving force due to helical force. By increasing the time, this rate becomes slow due to the counteracting effect of gravity force in the lateral direction. Fig. 4 shows the longitudinal bed profile near the inner bank, outer bank and centerline of channel bend. It is clear that these profiles have oscillatory behavior.

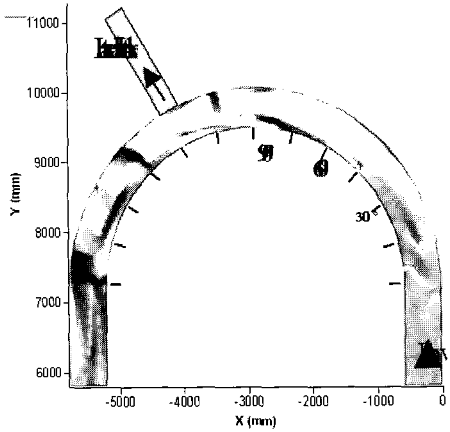

Fig. 1 Typical bed topography for (h=13.6 cm and Time=2 hour).

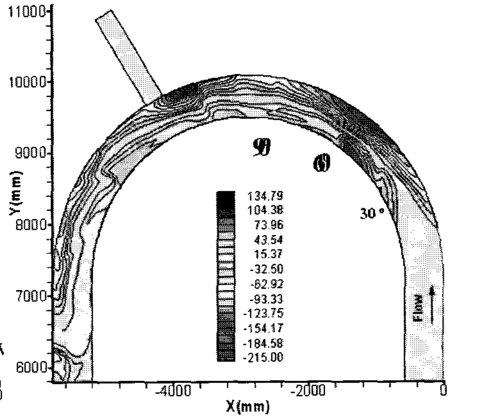

Fig. 2 Typical bed topography for (h=13.6 cm and Time=4 hour).

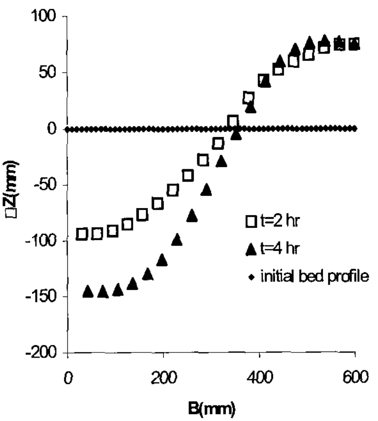

Fig. 3 Variation of transverse bed profile with time for section of maximum deposition i.e. section 52°.

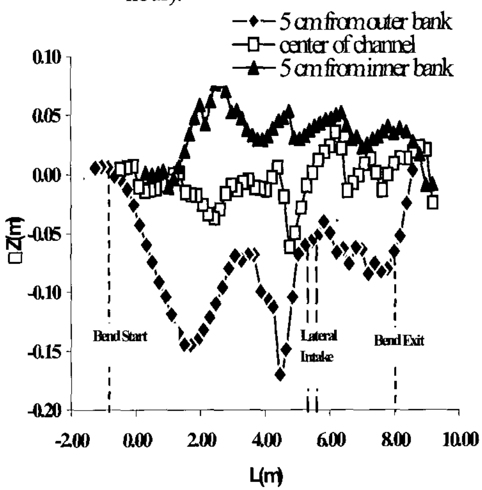

Fig. 4 Variation of longitudinal bed profile along the inner, center and outer of channel bend

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