

CIVE 717 RIVER MECHANICS

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Computer problem #1 due February 22

Solve computer problem 3.1 on p. 63 of the text *Erosion and Sedimentation* after considering that a 15 km reach at a bed slope of 100 cm/km has been added to the upstream portion of the channel sketched on p. 49. The width of the added segment has the same width as the lower reach. Assume a constant value of the Manning coefficient $n = 0.025$ throughout the entire reach. It is fine to assume a wide-rectangular channel for the calculations. Solve the problem in SI units and discuss the results of the three main graphs: flow depth, velocity and shear stress in m, m/s and Pa respectively.

Replace the rigid boundary with uniform bed material with a grain diameter of 0.2mm. Consider that the sediment inflow at the upstream end is that of steady-uniform flow and that the bed elevation is fixed at that point. At the downstream end, the remaining water and sediment discharges are conveyed downstream of the dam (no change in flow depth in the reservoir). Calculate the sediment discharge by volume

$$q_{sv} \sim 18 g^{0.5} d_s^{1.5} \tau^{*2}.$$

Provide a diagram showing the sediment transport distribution over the entire reach.
