

CE 717 – RIVER MECHANICS

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COMPUTER PROBLEM # 1 due February 2, 2012

Aggradation and Degradation

This assignment is in reference to the computer assignment in the course Erosion and Sedimentation. In CIVE 716, you readily calculated flow depth, velocity, shear stress and bed load transport from the backwater analysis under constant discharge and friction factor.

A. Estimate the bed material discharge in metric tons per day using the method of Brownlie (see Chap. 11 of *Erosion and Sedimentation* for the formula). Assume that the upstream bed elevation is fixed, and the upstream sediment supply corresponds to steady uniform flow conditions. Provide a diagram showing the sediment transport distribution in metric tons per day over the entire reach. You can use either a constant value of Manning n or Darcy-Weisbach f for the entire reach and it is fine to ignore the effects of bedforms.

B. Use a simple finite difference scheme of the equation describing continuity of sediment. For instance, you can use Equation 12.9a in *Erosion and Sedimentation* for constant width channels, or Equation 4.46 of *River Mechanics* for channels with variable width. Find a suitable grid size such that the trap efficiency over a grid cell is close enough to unity. Carry out calculations til the reservoir is approximately half full. Provide sketches at different times (e.g. select logarithmic time scales including ...1 day, 10 days, 100 days...) showing significant changes in bed and free surface elevations. Also compare the sediment transport rates in metric tons per day (calculated in A above) at these different times. The Section 11.2.5 p. 375 of RM should be useful in your analysis. Your graphical results should look somewhat like those of Figure 11.8 in *River Mechanics*. Briefly discuss the assumptions, methods, numerical schemes and results. Show evidence of your computer program and provide selected printouts on 8 1/2 x 11 paper.
