

CE 717 – RIVER MECHANICS

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COMPUTER PROBLEM # 1 due February 5, 2009

Aggradation and Degradation

This assignment is in reference to the computer assignment (Computer Problems 3.1, 8.2 and 9.1) in the course Erosion and Sedimentation. In CE 716, you readily calculated flow depth, velocity, shear stress 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 Yang (see Chap. 11 of *Erosion and Sedimentation* for details). Assume that the upstream bed elevation is fixed and the upstream sediment supply from steady uniform flow conditions. Provide a diagram showing the sediment transport distribution over the entire reach. It is fine to assume either a constant value of Manning n or Darcy-Weisbach f over the entire reach and 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. Your 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.
