

**CIVE-716 EROSION AND SEDIMENTATION
FINAL EXAM**

Monday December 15, 2015, 11:50 - 1:50 pm

Name: P. Julien

Problem #1 (5 points) – SI

Consider the data from the Yangtze River in Problem 6.7 on p. 137. Estimate the depth-averaged velocity from the three-point method 2.49 m/s

Problem #2 (15 points) - English

From the data in the Case Study 12.2 (i.e. Molineros Reservoir), determine:

1. the specific weight of the sediment deposits after 10 years: 32 lb/ft³
2. the mean annual sediment load 100 × 10⁶ tons per year
3. the daily sediment load for the 1,000 year flood from the sediment-rating curve 32 tons per day

Problem # 3 (80 points) - SI Units

Consider a large flood on a large river: width = 180 m, depth = 5 m, discharge Q = 1,800 m³/s, d₅₀ = 4 mm and d₁₀ = 0.5 mm. Calculate the following at a temperature at 15°C, angle of repose φ = 34° and slope 4m/10km:

- | | | | | |
|--|------------------|---|-------------------------------|-------------------|
| 1. Kinematic viscosity | v | = | <u>1.14 × 10⁻⁶</u> | m ² /s |
| 2. Shear velocity in m/s | u* | = | <u>0.14</u> | m/s |
| 3. Dimensionless grain diameter | d* | = | <u>92.7</u> | |
| 4. Settling velocity | ω | = | <u>0.23</u> | m/s |
| 5. Critical shear stress in Pa. | τ _c | = | <u>2.58</u> | Pa |
| 6. Manning n | n | = | <u>0.029</u> | |
| 7. Froude number | Fr | = | <u>0.28</u> | |
| 8. Darcy-Weisbach f | f | = | <u>0.041</u> | |
| 9. Grain roughness height | k _s ' | = | <u>0.2</u> | m or 0.027m |
| 10. Transport-stage parameter | T | = | <u>2.42</u> | |
| 11. Grain Shields parameter | τ* | = | <u>0.137</u> | or 0.229 |
| 12. Dune height from van Rijn | Δ | = | <u>1</u> | m |
| 13. Bed load discharge from DuBoys using τ* | Q _{bm} | = | <u>31,000</u> | met.tons/d |
| 14. Near bed sediment concentration | Ca | = | <u>2000</u> | mg/l |
| 15. Rouse number assuming κ = 0.4 and β _s = 1 | Ro | = | <u>4.1</u> | |
| 16. Sediment concentration at mid-depth in mg/l | C _{0.5} | = | <u>0</u> | mg/l |
| 17. Bed material discharge from Engelund-Hansen | Q _{bm} | = | <u>20,000</u> | met.tons/d |
| 18. Length scale for lateral mixing | X _t | = | <u>92</u> | km |
| 19. Trap efficiency over 20 m | T _E | = | <u>37%</u> | |
| 20. What sediment sampler(s) would you use? | Sampler(s): | | <u>BMSU</u> | |

Helley Smith / Sed. Trap.

IMPORTANT! Attach calculations to test.

Happy Holidays!