SUPPLEMENTARY MATERIAL FOR THE PAPER

Interaction between curvature-driven width oscillations and channel curvature in evolving meander bends

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S1

Comparison of the phase lag of the maximum predicted scour by the O(ν) solution with the experimental observations of Colombini et al. (1992). Though the trends of the phase lags with λ and β cannot be fully quantitatively predicted by the O(ν) solution, the descending trends in β and in λ are correctly predicted by the theory.

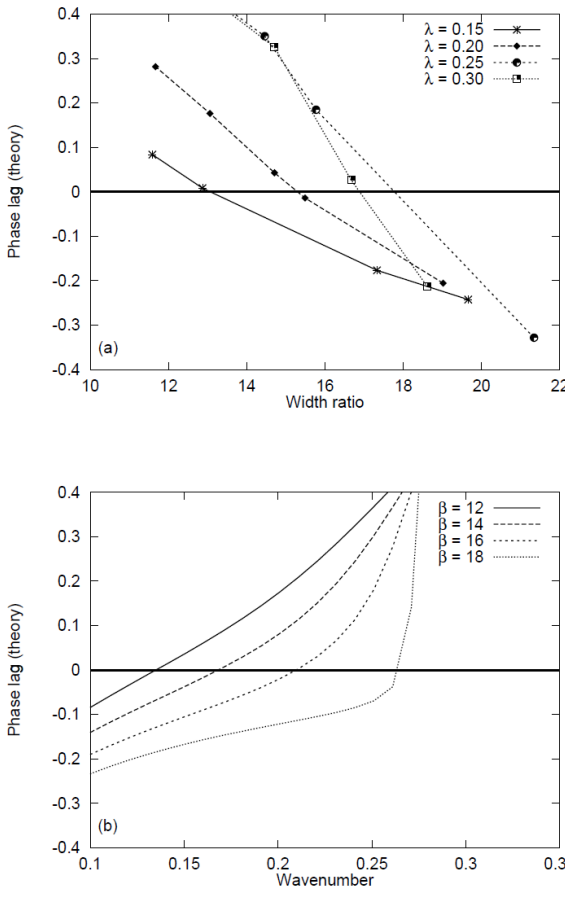

Figure 6.2 in Zolezzi (2000):
Phase lag of the bed elevation
Predicted by O(ν) analytical solution

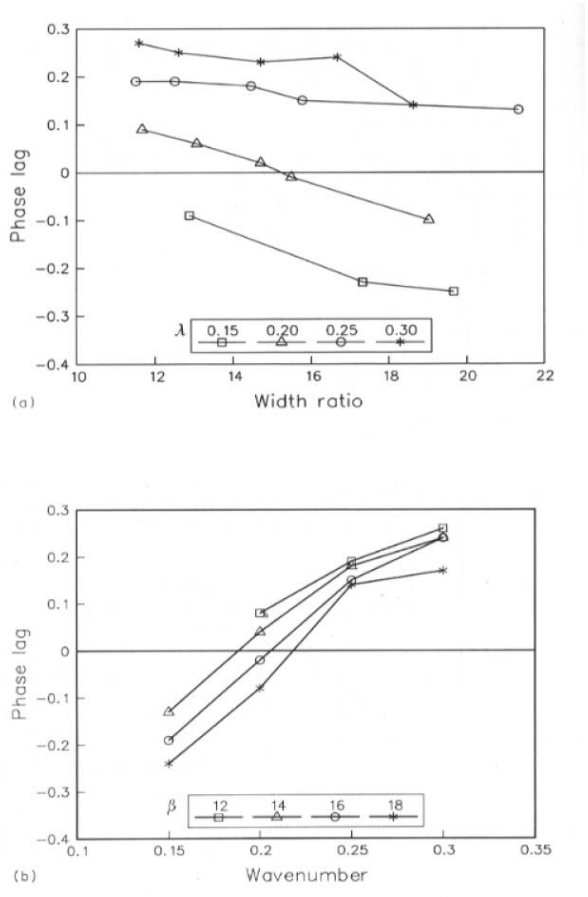

Figure 23.4 in Colombini et al. (1992)
Phase lag of the bed elevation η
Experimental observations

S2

Fortran code used to compute the mathematical solution at the different orders (v, δ, $\mathbf{v}^2$, v δ) and Python code for the computation of the planform development.

The solution at different perturbation orders is computed through a Fortran code that takes the reference flow condition (β, Θ, d_s) and meander wavenumber λ as inputs and computes the solutions $U_{ij}(s,n)$ for the first and the third harmonics. The solution is taken at the banks (n=±1) and used to compute the local erosion rate at the two banks. The described process is repeated at each time step to feed the Python code that computes the planform evolution of a periodic meandering river. At each step the banks are displaced according to the local erosion rate. The corresponding displacement of the channel centerline contributes to the variation of the reference flow parameters (β, Θ, d_s) and meander wavenumber λ, which affect in turn the erosion rate.

The entire process is computed until bend cutoff occurs.

REFERENCES

Colombini, M., Tubino M., Whiting P. 1992 Topo-graphic Expression of Bars in Meandering Channels. In Dynamics of Gravel Bed rivers, Ed by P. Billi, D.R. Hey, C.R. Thorne, P. Tacconi. John Wiley & Sons Ltd., 457 -474

Zolezzi, G. 2000 River meander morphodynamics. PhD thesis, University of Genova, Italy