Hydrology and Earth System Sciences

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Discussions

Interactive comment on "Uniform flow formulas for irregular sections" *by* E. Spada et al.

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The paper does need further clarification.

1. Is this the non-vegetated river?

2. Question (5) is all about flow development along the very short model length. Are the flow parameters (velocity, TKE, bed shear stress...) reached fully development state within the modelled length? The authors need to provide evidence of longitudinal profile of flow parameters (Longitudinal velocity, TKE, bed shear stress...) along the reach. Otherwise, they need to use fully developed condition at inlet boundary (see Rameshwaran et al. 2013 section 5)

3. Question (6 & 7) and answer (6 & 7):

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The equation can be simplified ignoring some small terms as (correct me if I am wrong):

$u/u^* = (1/k)\ln(y/0.15d50) + C$

where $d50 = 0.73$ m and $y = 0.07$ - What is your $y+$?

Using above $k = 0.41$: $u/u^* = -1.091291 + C$

The above equation is meaningless unless C is positive and greater than 1.091291. What is C? (Refer to Introduction section in Rameshwaran et al. 2011 and other papers in my earlier comments). The first term is negative in the equation because the y is too small and d50 too big.

It is therefore not numerically valid to use wall function approach to model flow over gravel beds with d50 = 0.73 m (see papers in my earlier comments).

References

Rameshwaran, Ponnambalam; Naden, Pamela; Wilson, Catherine A.M.E.; Malki, Rami; Shukla, Deepak R.; Shiono, Koji. 2013 Inter-comparison and validation of computational fluid dynamics codes in two-stage meandering channel flows. Applied Mathematical Modelling, 37 (20-21). 8652-8672. 10.1016/j.apm.2013.07.016

Rameshwaran, Ponnambalam; Naden, Pamela S.; Lawless, Mark. 2011 Flow modelling in gravel-bed rivers: rethinking the bottom boundary condition. Earth Surface Processes and Landforms, 36 (10). 1350-1366. 10.1002/esp.2158

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