

Review of:

Notes on the estimation of resistance to flow during flood wave propagation

Magdalena M. Mrokowska¹, Paweł M. Rowiński¹, and Monika B. Kalinowska¹

This article presents an analysis of floodwave propagation in the Olszanka River, a small tributary of the Wilga River in Poland. The authors suggest that the shear stress or shear velocity should be used instead of resistance coefficients like Manning n .

The following should be considered for improving this article:

1. It does not make much sense to replace a resistance parameter with another one. The idea to replace Manning n with the shear velocity is redundant. The essence of resistance to flow relationships is to define the relationship between the mean flow velocity V and the shear velocity u^* . For instance, the Darcy Weisbach friction coefficient f is defined as $f = 8 (u^*/V)^2$. The Manning formula is somewhat similar but involves a function of flow depth to the power $1/6$. So the resistance coefficients already have a built in function of the shear velocity. So for the above example, to replace f with a function of u^* does not simplify things, it also requires measurements of the mean flow velocity V , which is usually what we are looking for. In an ideal world where all parameters are known, the author's idea may make some sense, but in most practical applications where V is the unknown, knowledge of both f and u^* or n , u^* and h are required. In other words, the approach of the authors does not make much practical sense.
2. The use of Manning n (or Chezy C or Darcy-Weisbach f) will not disappear from engineering practice. These methods have been applied for a long time and practitioners have a good feel for what is a high or low Manning n value. The authors suggesting a use of u^* instead will have to define what is a high u^* and what is a low u^* value. There is only doubt that this will prove to be a successful method on the long run. My point here is that the authors are facing strong headwinds and their paper is not very convincing to change well established understanding of rivers.
3. There is data of seemingly good quality during flood propagation, but I do question whether these can be called river flows. I thought something was missing when I noticed discharges less than $1 \text{ m}^3/\text{s}$ in some graphics. The graphs are misleading, and it is misleading to call this river flows in the first place. This looks like a small drainage at best.
4. The drainage network presented in Figure 3 seems rather complex. There are forks and tributaries coming into play and the cross-section geometries are not that simple. It is not clear at all that the flows are exactly described by simple equations. Also, the trapezoidal channel geometries raise questions regarding how the shear velocity values are determined. Are those the cross section average value or the values of shear stress (velocity) at the deepest point.
5. One of the problems with the shear velocity concept is that it is not clear what method should be used. The authors are well read and provide several good

- methods for evaluating the shear velocity in gradually varied unsteady flows. It is not clear which of these methods would be best for all cases.
6. I wish I could see a photo of this site, but I can imagine that there is vegetation involved and it is not clear how the vegetation factors are taken into account in different seasons.
 7. There are several cases OL 1-4 and I am not sure they are all needed. Would one or two be sufficient to make the case.
 8. The article is quite long and this should be shortened quite substantially.
 9. There are tons of references all the way to the conclusions and the reader gets lost as to what is the main contribution of the authors as compared to what can be found in the literature. I would think that the number of references could be reduced by at least 50%.
 10. The peak values of resistance coefficients may be the most important for engineering design. What is the difference in predicted stage values with the Manning n approach versus the u^* approach that is proposed. By the way, I am still not clear as to what is the correct method for the evaluation of u^* that the authors propose.

In summary, there is some interesting information in this article but it would need quite a bit of work before publication. There should be a clear presentation of a proposed method. I am sure that a method based on shear velocity will not lead anywhere, and if it is still the intent of the authors after modification of this article, I doubt I would recommend publication. The presentation on the definition of shear velocity in trapezoidal channels with vegetation (at least during some time of year) is quite complex and cannot be over-simplified with a simple analysis of the Saint-Venant equations.

In conclusion, this article is not ready for publication and quite a bit of work would be required per the above discussion. There should be a change of direction away from the shear velocity approach. An analysis of the Saint-Venant terms seems promising and may have more value than the shear velocity. It could be combined with Manning n or Chezy C for instance, but again, the idea of shear velocity seems dead-ended. With modifications along this line and a better description of the site and tremendous reduction in the number of references and redundant text, and a reduction of the number of cases (OL-1-4) to focus on the main ones would be desirable. I would think that a clear explanation of the method of analysis of trapezoidal channels with vegetation – I guess pls show a picture – would be a nice addition. If this is possible from the authors, I would gladly re-review this manuscript. I definitely would like major changes to this paper. If the authors insist on their views with the shear velocity approach, it is likely to end up a useless exercise to ask my opinion about it.

I cannot recommend publication of this article in the present form, but see potential for major changes and improvement of this manuscript. I sincerely hope that the authors will have the courage to thoroughly rework this manuscript, with my best regards.