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In this simulation $h_2 \approx h_1 = 10$, and the Froude number computed from (18) is $Fr = 1.04$, which is less than 15/8, and hence, as predicted from (17) the bore wave does not appear.

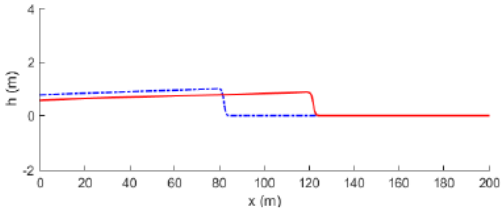

Fig. 13. Surface profile in the simulation of lost Bono scenario 1. It is shown that the bore height decreases as it propagates further downstream.

5. CONCLUSIONS

The staggered grid scheme of the Saint Venant equations was shown to be suitable and accurate for simulating various tidal bore scenarios, subsequently by incorporating the hydrodynamic pressure, an undular bore that follows the shock front emanates. By adopting tidal current data obtained from measurement, the formation of tidal bore Bono was simulated. The comparison between the numerical surface and the surface measurement at Tanjung Tersendu-sendu has shown a good agreement. Through a good understanding of the physical mechanisms of a tidal bore, we hope that the tidal bore Bono in Kampar River can be maintained properly.

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REFERENCES

Aldrighetti, E. (2007). *Computational hydraulic techniques for the Saint Venant Equations in arbitrarily shaped geometry*. Ph. D. thesis, Universita` Degli Studi di Trento, Trento, Italy.

Bayu, A. C., S. R. Pudjaprasetya and I. Magdalena (2017). Three-layer nonhydrostatic staggered scheme for free surface flow. *East Asian Journal on Applied Mathematics* 7(4), 643˚ 657.

Chanson, H. (2009). Environmental, ecological, and cultural impacts of tidal bores, benaks, bonos and burros. In P. I. R. G. L. P. F. M. S. G. P. S. P. A. Lopez-Jimenez, V. S. Fuertes-Miquel (Ed.), Proceedings of the International Workshop on Environmental Hydraulics IWEH09, Theoretical, Experimental and Computational Solutions, Valencia, Spain, pp. 1˚20. International Workshop on Environmental Hydraulics.

Kim, D. H. and P. J. Lynett (2011). Dispersive and nonhydrostatic pressure effects at the front of surge. *Journal of Hydraulic Engineering* 137, 754˚765.

Rahmawan, G. A., U. J. Wisha, S. Husrin and Ilham (2016). Bathymetry and tidal analysis for Kampar Big River Estuary: Generate of Tidal Wave Propagation Undular Bore Bono, Geomatika 22(2), 57-64.

Stelling, G. S. and S. P. A. Duinmeijer (2003). A staggered conservative scheme for every froude number in rapidly varied shallow water flows. *International Journal for Numerical Methods in Fluids* 43(12), 1329˚1354.

Vo Thi, N. T. (2008). *One dimensional saintvenant system. analysis of pdes*. Master sthesis, Universite d Orleans, Orleans, France.

Yulistiyanto, B. (2009). The phenomenon of bono rising wave in kampar river estuary. *Dinamika Teknik Sipil* 9(1), 19˚26.

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