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Editorial

Environmental Hydraulics, Turbulence and Sediment Transport

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Within the environmental flows, i.e., river and canal networks or irrigation systems, hydraulic properties for water flow are usually impacted by eddies and sediment transport. Thus, the accuracy in predicting natural environmental flow behaviour is heftily related to the precise knowledge on its morphological characteristics under naturally occurring turbulence circumstances. The deposition and erosion under sediment-laden flow also play a crucial role in how the natural flows and watercourses are supposed to be managed to alleviate and avoid disastrous pollution transport.

In a previous Special Issue (SI) of *Fluids* entitled "Environmental Sediment Transport: Methods and Applications", the sediment transport phenomenon has been explored in the applications of natural bedform (Pu [1]) and deposition within rainwater (John et al. [2]). As a continuation, the leading guest editor for that SI decided to launch a new volume to further advance and expand on the discussion topics. This SI, which contains a collection of seven papers, gathers recent advances in the fields of environmental hydraulics, turbulence and sediment transport from various international authors/researchers to tackle the above-mentioned important and pressing environmental issues.

Owing to the fact that suspended solid transport is among the important factors to alleviate pollutant propagation, its mathematical modelling has been intensely investigated in recent literature studies. In the review work by Wallwork et al. [3], the previous research on mathematical modelling of suspended sediment transport has been summarised and analysed. Besides numerical models, the suggested analytical approaches in the literature to represent the suspended load have also been reviewed. Wallwork et al.'s study increases the potential for researchers to learn from previous experiences and studies in order to move towards the goal for accurate sediment transport modelling.

Sediment-laden condition is regarded as one of the key mechanisms to the formation of rough bedform in natural flow (Pu [1]). To add to the complexity, any obstruction like wood-log or boulder, in particular those obstructions across channel width, can attach with the bedform during its formation to cause floods. To study the impact of the horizontal obstruction in rough bed flow, Devi et al. [4,5] have run a series of experiments by bed-mounted cylinder to investigate their flow velocity [4] and turbulence [5]. Using an acoustic Doppler velocimetry (ADV) measurement approach, Devi et al. [4] concentrated on comparison between flow properties impacted by sand and gravel-formed beds, while Devi et al. [5] considered the turbulence of flow above sand bed by high-order bursting analysis. The findings by [4,5] are crucial for consolidating the knowledge of turbulence field induced by the horizontally laying cylindrical obstacle and predicting its actual flow characteristic over a rough bed.

Tailing dam has been studied by Satyanaga et al. [6], where its sediment tailings have been investigated by incorporating the unsaturated solid mechanic approach. In their study, the soil consolidation process was illustrated to observe the stability of sediment within the dam. The experiment together with numerical analysis proposed within Satyanaga et al.'s study is particularly crucial to understand and manage the operation of the tailing dam. To better understand the dynamics of dredging and its impact on sediment transport within the natural river/watercourse environment, Zikra et al. [7] has studied a case at

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Nagan Raya Port of Indonesia. In their work, the numerical modelling and field study have been co-utilised, where the results showed a severe impact of dredging towards negatively promoting the sediment transport surrounding the port. The study by Zikra et al. [7] presented useful guidelines not only to the local Nagan Raya Port, but also to portA with similar natural environments.

In supporting structures above the water, various stability research has been performed for many common water-based structures. In the investigation by Bento et al. [8], the flow field around the bridge pier's scour has been studied. The oblong bridge piers have been concentrated in their study, where the proposed experimental results can explore the scour development pattern and hence is useful for the stability study of the bridge's structure. Besides rigid structures like bridges, the floating structures with high degrees of flexibility are also popularly used in water-based projects, e.g, as petroleum drilling platforms. Cui et al. [9] studied the hydrodynamic moment of such flexible structure using 121 sets of detailed experiments. Their results can shed the light on the relative industry in terms of the structural stability and durability subject to constant hydrodynamic loading.

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