Editorial

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No matter how trivial, first I would like to begin by wishing you a happy New Year on behalf of the editorial advisory board of *Engineering and Computational Mechanics*. The beginning of a new year is also the best time to weigh up the past and consider the prospects for the near future. Our journal is devoted to mechanics – both solid and fluid mechanics. Therefore, what better opportunity to trace a possible common collaboration line between the different areas of mechanics and a link between classic, older and newer aspects of a research topic? In 1959 the physicist Richard Feynman (Caltech) gave a talk called ‘There’s plenty of room at the bottom’ to the American Physical Society’s West Coast section. He outlined a vision of what would later be called nanotechnology, imagining ‘that we could arrange atoms one by one, just as we want them’. That famous talk is often credited with kick-starting nanotechnology. Many current construction problems and requirements of construction processes can be enhanced using nanotechnology, generating products with many unique characteristics: lighter and stronger structural composites; low-maintenance coatings; better cementitious materials; lower thermal transfer rate of fire retardant and insulation; better sound absorption of acoustic absorbers and better reflectivity of glass (Zhu *et al.*, 2004); superhydrophobic surfaces, which have attracted much attention lately as they present the possibility of achieving a substantial skin-friction drag reduction in turbulent flow (Park *et al.*, 2013). This is a typical example of a multidisciplinary approach, the core of our journal, which will become much more fundamental in the future.

Pending further developments, research in the field of structural engineering must also continue improving classic materials. For example, it is possible to strengthen steel beams with polymers, as show in the paper by Kadhim *et al.* (2017). This paper reports on an interesting numerical simulation of a series of steel beams strengthened with carbon-fibre-reinforced polymer laminates and subject to impact loads. The numerical results presented by the authors show that the use of externally bonded laminates decreases mid-span deflection of strengthened beams.

Additional key parameters, such as laminate thickness, are also investigated in this study.

Even if the materials engineering developments lead to new horizons, there is always room for classic building techniques, which are always very interesting and important, as shown for the arch bridges in the briefing by Long and Nanukuttan (2017). Arches appeared as early as the second millennium BC in Mesopotamian brick architecture and their systematic use started with the ancient Romans. The Romans were the first builders in Europe, perhaps the first in the world, to appreciate fully the advantages of the arch, the vault and the dome. Throughout the Roman empire, Roman engineers erected arch structures such as bridges, aqueducts (Fabre *et al.*, 1991) and gates. In their briefing, Long and Nanukuttan (2017) observe that arch bridges are strong, durable, aesthetically pleasing and require little maintenance, but very few have been built since the early 1900s. However, this trend has changed as more than 60 FlexiArch bridges have been installed since the system was launched in 2007. Further interesting details can be read in the briefing.

The second full-length paper (Wang *et al.*, 2017) is devoted to bores and hydraulic jumps. Sketched by Leonardo da Vinci (Clark and Pedretti, 1968), observed in nature and utilised by engineers for a century, it might be thought that the hydraulic jump had yielded all its secrets some time ago. The history of its scientific study dates at least from the paper of Bidone (1820), who described the hydraulic jump with the following words: ‘If, when a stream has been established in a rectangular channel ... the flow of water is totally impeded by lowering a gate in any section of the channel itself, the waters thus restrained rise immediately up to a certain height against the gate and form an intumescence’. As shown by Mossa and Petrillo (2002, 2003), even if hydraulic jumps have been studied for centuries (Bidone (1820), Bélanger (1828), Guglielmini (1739), Rouse *et al.* (1958) with their air model, Resch *et al.* (1974), Bakhmeteff and Matzke (1936), which is one of the

most complete investigations of the average jump profile and length, Mossa and Tolve (1998), Mossa (1999)), the research on this transition flow and its related flow motions, such as tidal bore or surge, is still relevant, as shown by Wang *et al.* (2017) in their interesting paper. In fact, the authors show that the flow structure in the roller remains a great research challenge due to large quantities of entrained air, bubble turbulence interactions and the coupling between turbulent properties and free surface deformations. From the authors' paper, Figure 1 shows a particularly striking and attractive photograph of Qiantang River tidal bore at Yanguan (China).

This issue highlights the increasing success of the journal, which is evident in many ways: for its natural propensity to publish multidisciplinary research results, having interest both in solid and fluid mechanics (and we have highlighted how future research benefits from a multidisciplinary approach), for its interest in publishing papers which deal with classical topics

Figure 1. Qiantang River tidal bore at Yanguan (China) on 7 September 2013 – view from the left bank with upstream bore propagation from left to right

but always highlighting new and interesting developments and, not least, for the recognition that has been gained by the best examples of the published papers. I hope that the papers will also stimulate interest among both researchers and practitioners, leading to the development of novel techniques and to exciting new applications.

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