Editorial note

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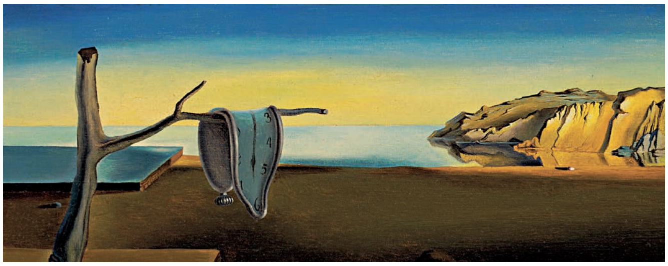
It is an honour to welcome readers of *Építőanyag – Journal of Silicate based and Composite Materials* and to announce our 2015/4 issue as Special Edition dedicated to **icrmm2**, the 2nd International Conference on Rheology and Modeling of Materials, October 5–9, 2015, Lillafüred, Hungary.



Two years ago **icrmm1**, the 1st International Conference on Rheology and Modeling of Materials was organized in Lillafüred, Hungary, with the participation of more than 150 scientists and researchers arrived from more than 40 countries. The very successful event have demonstrated that rheologists – engineers, geologists, chemists, physicists, mathematicians, biologists, physicians – need to have a possibility to regularly meet each other in the heart of Europe.

Rheology – as a scientific discipline – studies the deformation of bodies under the effect of stresses. In this context bodies are considered generalised and they can be either solids, or fluids, or gases; rheology universally studies the deformation and flow of any matter. Rheology was preceded by theories describing ideal materials like Robert *Hooke's* ideal elastic solids (Hooke, 1678), Blaise *Pascal's* inviscid fluids (Pascal, 1663) or Isaac *Newton's* ideal fluids (Newton, 1687). Real materials are neither ideal solids nor ideal fluids. Real materials usually exhibit both elastic and viscous behaviour and are called viscoelastic. Complicated deformations are formed under mechanical stresses due to the internal structure of real materials and the relationships between stress and strain can not be defined by elastic and viscous constants alone; the behaviour depends on time, direction and intensity of stress or extent of deformation.

Rheology is a relatively young and highly multidisciplinary field and is one of the very few scientific disciplines which appearance can be tied to a precise date: 29 April, 1929. The first committee meeting of The Society of Rheology was organized on 29 April, 1929 at Columbus, Ohio, USA, where the term *rheology* was proposed by Eugene C. *Bingham* and Markus *Reiner* to describe "the study of the flow and deformation of all forms of matter". The term *rheology* was inspired by the aphorism of *Simplicius* (often attributed to *Heraclitus*), πάντα ῥεί: everything flows. With his own words, *Reiner* recalls (Reiner, 1964): "Rheology has become a well-known branch of physics, but most typists think it is a misprint for theology" (i.e. the letter *R* and the letter *T* are next to each other on the QWERTY keyboard and rheology is easy to be mistyped as theology). "This seems ridiculous, but there is some relation between rheology and theology, and on this I want to say a few words… Prophetess Deborah, even before Heraclitus, in her famous song after the victory over the Philistines, she sang, "The mountains flowed before the Lord." … Deborah knew two things. First, that the mountains flow, as everything flows. But, secondly, that they flowed before the Lord, and not before man, for the simple reason that man in his short lifetime cannot see them flowing, while the time of observation of God is infinite. We may therefore well define as a nondimensional number the Deborah number *D = time of relaxation/time of observation*… If your time of observation is very large, or, conversely, if the time of relaxation of the material under observation is very small, you see the material flowing." Everything flows if you wait long enough, even solid rock.

The aphorism πάντα ῥεί also holds a hidden message to challenge the non-professional for unleashing his fantasy. There is a popular world-wide myth about stained glass windows in cathedrals, according to which noticeable change in thickness (=flow) is formed by gravity forces over hundreds of years, and stained glass cathedral windows are thicker at the bottom than the top due to this effect. One famous example is the glass windows of the Cathedral of Chartres in France that are said to have flown since they were produced centuries ago: it is claimed that the glass panes originally had a uniform thickness from top to bottom in mediaeval times, but today the thickness at the top is paper-thin while the pane thickness has more than doubled at the bottom due to the flow induced by gravity. Main reason for this misconception can be most probably attributed to the idea that glass cannot be classed simply as fluid or solid, but rather glass behaves as a liquid or solid under certain conditions of stress, shear rate or time. At room temperature glass has a viscosity about 10^{40} Pa·s. Calculations made by *Zanotto* and *Gupta* (1999) have shown that the timescale over which flow of glass might be realized at room temperature is in the range of 10^{23} years, thus is well beyond the estimated age of the Universe (10^{10} years). Theory implies that the dimensional variations of the stained glass windows in cathedrals are not caused by cold flow of glass. An explanation can be speculated in connection with the manufacturing techniques of ancient glass. These techniques produced glass that was inherently not of a uniform thickness, unlike the glass made by the float glass process of today. Ancient window glasses were blown into cylinders that were split and flattened manually. Hence, the pieces were not uniform in thickness and some lower parts could be thicker than the upper parts. It is quite possible that the cathedral window makers installed the cut up windowpanes instinctively with thicker side at the bottom (Zanotto, Gupta, 1999). Professionalism of cathedral window makers - based on their instinct or experience – has given rise to the non-professional urban myth of flow of glass at room temperature, hundreds of years later.

Rheology covers different topics in the development and processing of polymers, ceramics, adhesives, mortars, concretes, asphalts, paints, inks, lubricants, surfactants, emulsions, suspensions, foams, ferrofluids, magneto-rheological materials, molten metals and glasses, cosmetics, pharmaceutics, foods, dairies and biological systems. Applications of rheology are virtually endless and the topic would - in itself - fill several books. Thus, the Editorial Board of *Építőanyag – Journal of Silicate based and Composite Materials* decided not to give a comprehensive survey in this Special Edition (that would be simply impossible for a journal issue), but to provide a colourful collection of special topics presented at the **icrmm2** conference. Authors represent high rank institutes from different continents and show their most recent theoretical and experimental results.

References

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