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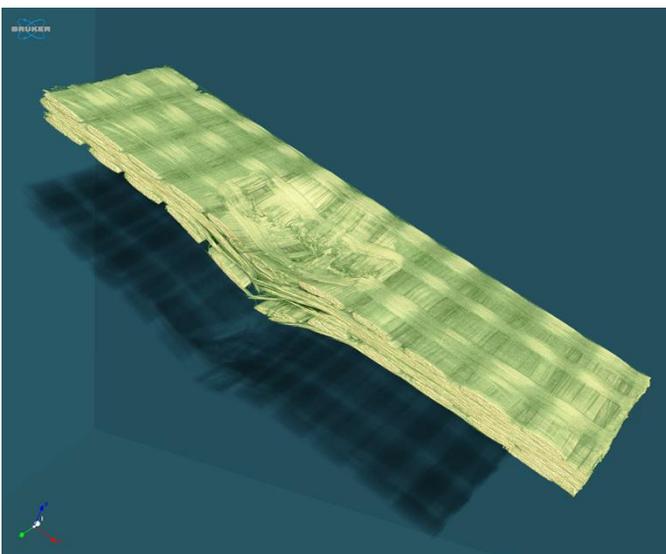
● Welcome

This month's edition focusses on fiber characterization and the closely connected topic of orientation analysis. Still three months separate us from the annual User Meeting, but the deadline for paper submission is closing in. We are looking forward to receiving your papers!

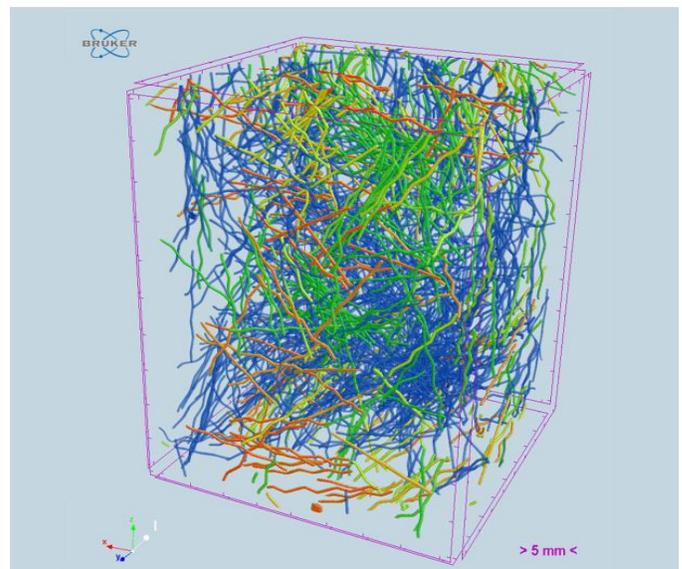
● Fiber analysis

Fibrous structures are some of the most abundantly encountered in both natural and synthetic materials. Micro-CT offers the possibility to analyze both individual fiber properties (e.g. diameter) as in relation to each other (e.g. orientation distribution). The interface between fiber and matrix material in composites and characterization of breakage mechanism is also of particular interest in regards to micro-CT, not in the least because of the inherently non-destructive nature of the technique.

We distinguish two general situations: that where individual fibers or fiber bundles can and need to be resolved separately and the inverse. They differ in the types of algorithms that can be employed and the information that can be extracted. If, for instance, one is interested in getting a fiber length distribution, separable fibers are greatly advantageous, but for fiber orientation distribution it is much less required.



The volume rendering image shows a fiber reinforced polymer composite after impact analysis. It was scanned using the SkyScan 1272 with image pixel of 8.6 μm .



A steel fiber reinforced concrete sample was scanned using the SkyScan 1173 with image pixel of 56 μm . The volume rendering image shows objects color coded by orientation in 3D. It illustrates the importance of suiting analysis protocol selection: many fibers are touching which skews the results.

● Orientation

In case fibers or fiber bundles cannot be separated a popular method to calculate the fiber orientation is an [advanced stereology calculation in CTAn](#). Through the analysis volume containing our binarized objects a grid of test lines are virtually drawn from large number of angles in 3D. The mean intercept length MIL of the objects and test lines allow us to construct a tensor of which the eigenvalues give us to the predominant object orientations. We refer to method note '[MN031 Anisotropy, Mean Intercept Length \(MIL\) and stereology](#)' and the CTAn manual for more information on this topic.

The CTAn [individual object analysis](#) plug-in can be run both in 2D as in 3D space. With these tools in depth geometric characterization of fibers is possible. The latest version of CTAn offers the possibility to generate colour coded images according a number of morphometric characteristics (size, orientation, major diameter). The orientation in 3D space is determined by the main eigenvalues of the second moments of inertia of the objects. The object colour coding can then be done either by angle or by local thickness.

For more information on the topic of fiber analysis and orientation we kindly refer to '[MN084 - fiber characterization - orientation in 3D](#)'.

● Bruker microCT News

- Important update for CTAn is available on the [website](#), which including color coding of objects according to orientation in 3D.
- The Bruker microCT User Meeting will take place in Brussels from 9 to 12 May. The deadline for paper submission is 18th of March; all info can be found on the [website](#).

● Upcoming events

Bruker microCT will participate with an exhibit in the forthcoming conferences. Please click the link below for more information. We hope to see you there!

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| ▪ IBMS | Feb. 28 – Mar. 01 | Bruges, Belgium |
| ▪ EMIM | Mar. 08 – 10 | Utrecht, the Netherlands |
| ▪ AACR | Apr. 16 – 20 | New Orleans, USA |
| ▪ ATS | May 13 – 18 | San Francisco, USA |
| ▪ ECTS | May 14 – 17 | Rome, Italy |
| ▪ WBC | May 17 – 22 | Montreal, Canada |
| ▪ IADR | Jun. 22 – 25 | Seoul, South Korea |
| ▪ SPWLA | Jun. 25 – 29 | Reykjavik, Iceland |

● Image of the Month

Two volume rendering images of a sand bubbler crab (Dotillidae family) from Malaysia. It was scanned using the SkyScan1172 at an image pixel of 8.87µm. These busy crabs are known for the structures made out of sand pellets they leave on the beach. They are characterized by gas windows on the legs, which are clearly visible in the images.

