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## **Explaining Deviatoric Residual Stresses and Load Transfer in Aluminum Alloys and Composites with Complex Microstructure**

*Thursday, 2 June 2022 11:00 (35 minutes)*

Explaining Deviatoric Residual Stresses and Load Transfer in Aluminum Alloys and Composites with Complex Microstructure

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The residual stresses and load transfer in multiphase metal alloys and their composites (with both random planar-oriented short fibers and particles) will be shown, as studied by neutron diffraction, by X-ray computed tomography, and by a model based on the reformulation of classic Maxwell's homogenization method.

Contrary to common understanding and state-of-the-art models, we experimentally observe that randomly oriented phases possess non-hydrostatic residual stress. Moreover, we disclose that the unreinforced matrix alloy stays under hydrostatic compression even under external uniaxial compression.

The recently developed modeling approach allows calculating the residual stress in all phases of the composites. It rationalizes the presence of deviatoric stresses accounting for the interaction of random oriented phases with fibers having preferential orientation. It also allows the explanation of the unconventional in-situ behavior of the unreinforced alloy and the prediction of the micromechanical behavior of other similar alloys.

**Presenter:** Prof. BRUNO, Giovanni (BAM Berlin)

**Session Classification:** Thursday Morning

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