The Hierarchical Data Format HDF5

- a Basis for an Emerging Standard in ICME Settings ?

G.J.Schmitz*

* MICRESS® group at Access e.V., Intzestr. 5, D-52072 Aachen, Germany
*g.j.schmitz@micress.de

ABSTRACT

The roles of microstructure simulation in integrating scales ranging from component/ process scales down to atomistic scales, and also in integrating experimental and virtual worlds, are shortly highlighted. The description of microstructures typically reveals and also requires an information hierarchy ranging from effective properties of the overall material via statistical information like grain size distributions, phase fractions, precipitate size distributions, defect densities and others down to full spatial resolution of e.g. of diffusion fields. Any digital representation of microstructures thus clearly benefits from a hierarchical data structure.

The hierarchical data format (HDF5) as a basis for enhancing the interoperability of the heterogeneous range of simulation tools and experimental datasets in the area of computational materials engineering is therefore discussed. The presentation will provide a short overview on HDF5 and its current applications in numerous fields of science and engineering. In the area of ICME, recent developments indicate that HDF5 might evolve into a de facto standard for 3D and 4D digital microstructure representations.

Following some demonstrations and examples of basic HDF5 file operations and exemplary HDF5 file structures, specific examples on the use of HDF5 in ICME settings are given and directions for future developments are discussed.

REFERENCES

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