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GCCE Seminar:
Analysis of vector fields via Helmholtz decomposition

Univ.-Prof. Dipl.-Ing. Dr.techn. Manfred Kaltenbacher,
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19th January 2023, 10:00 – 11.30
at Inffeldgasse 23, 8010 Graz, first floor, HSi10

In general, physical vector fields can be decomposed via Helmholtz into an irrotational (longitudinal) and solenoidal (transversal) field. In doing so, one will observe that a third field comes into play, which is divergence- and curl-free. Therefore, a unique decomposition is a challenging task and a topic of ongoing research.

The seminar will first introduce general properties of vector fields, Helmholtz decomposition and ideas of L2 orthogonal decomposition, where the boundary conditions play the key role. In a second part, the application to the compressible flow velocity field in the context of aeracoustics and to Maxwell's equations will be discussed. In aeroacoustic the basic question arises, which part of the compressible flow is associated with the vorticity (non-radiating) and which part describes radiation. In Maxwell's equations, we have the magnetic field, which is pure solenoidal, and the electric field which in-cooperates both longitudinal and transversal fields.

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All the interested are kindly invited and we hope to see you there.