Minisymposium 6 - Positive definite functions and applications

Positive Definite Functions in Aeroelasticity: Towards Airbus's Preferred Solution

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In fluid-structure interaction (FSI) the reciprocal action of a flexible structure with a flowing fluid, in which it is submersed or by which it is surrounded, is studied. Naturally, FSI has applications in many fields of engineering, such as the stability and response of aircrafts, the flow of blood through arteries, the vibration of turbine and compressor blades, and the response of bridges and tall buildings to winds.

In this talk, I will present an efficient scheme for loose coupling in fluid-structure-interaction problems as they typically appear in the context of aircraft design. This coupling scheme uses a multivariate scattered data interpolation approach, based on positive definite functions and partition of unity methods. It allows us to couple arbitrary meshes on fluid and structure side. It conserves virtual work and forces. It is designed for large scale problems and allows the coupling of entire aircraft meshes. Finally, it is currently implemented into MSC.Nastran to become Airbus's preferred solution in the field of Aeroelasticity.