Proposal for a Minisymposium

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Multiphysics Simulations with Time Resolved Turbulent Flow Fields

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PROPOSAL

An ongoing challenge in multiphysics simulations is the coupling of other phenomena such as structural dynamics or acoustics with a turbulent flow field. Typically, the considered effects are influenced by small-scale fluctuations of the flow and the coupled phenomena act on different time scales. The correct simulation of the time resolved turbulent flow field itself is a subject of recent research. Different methods such as DNS, LES, and hybrid RANS-LES models are considered. For all methods, the results are more or less sensitive to discretization parameters in time and space. Thus, it is decisive to ensure the correct setting of these parameters also in coupled simulations. The use of predictors in the time-stepping for multi scaled coupled problems allows to save quite some computing time. But how does the used predictor influence convergence and stability of the coupled solution procedure? Another important issue is the convergence of the overall coupling process, while turbulence is a chaotic phenomenon. From a high-performance computing point of view, additional questions concerning new numerical methods allowing for a load balanced parallel execution of the coupled simulation occur. Here, a very important task besides load balancing is the reduction of inter-process communication. This session should be a platform to discuss the advantages and disadvantages of numerical and computer science methods concerning to the aforementioned aspects.