Domain Decomposition for Rotating Electrical Machines in Space-Time

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Transient simulations of electrical machines are an important task in the design process of electrical machines. In classical time stepping schemes, the rotation is usually realized by distorting the mesh or by applying Mortaring. The former necessitates frequent remeshing and the latter careful choice of parameters. Another approach is to apply space-time finite element methods, where movement is already incorporated in the mesh. This is especially feasible when the movement is known in advance. In this talk we present a space-time finite element approach, where we make use of the special geometry of the two-dimensional model of an electrical machine and an analytic solution in the air gap. When using isogeometric analysis, and hence the exact geometry, this allows us to couple the air gap to fixed space- time meshes for the rotor and stator, even if the movement is not known in advance. Lastly, we give an outlook on how this approach can be extended to more general geometries.

References:

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