An Interpolation Tool for Data Transfer in Two-Dimensional Ice Accretion Problems

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Abstract : One of the difficulties in icing simulations is for extended periods of exposure, when very large ice shapes are created. As well as being large, they can have complex shapes, such as a double horn. For icing simulations, these configurations are currently computed in several steps. The icing step is stopped when the ice shapes become too large, at which point a new mesh has to be created to allow for further CFD and ice growth simulations to be performed. This can be very costly, and is a limiting factor in the simulations that can be performed. A way to avoid the costly human intervention in the re-meshing step of multistep icing computation is to use mesh deformation instead of re-meshing. The aim of the present work is to apply an interpolation method based on Radial Basis Functions (RBF) to transfer deformations from surface mesh to volume mesh. This deformation tool has been developed specifically for icing problems. It is able to deal with localized, sharp and large deformations, unlike the tools traditionally used for more smooth wing deformations. This tool will be presented along with validation on typical two-dimensional icing shapes.