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ENHANCING LOW-FIDELITY COMPRESSOR DESIGN BY UTILIZING A SURROGATE MODEL BASED ON HIGHER-FIDELITY INFORMATION

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Abstract. *Aerodynamic compressor design is typically performed as a sequence of subsequent 1D-, 2D- and 3D-subprocesses, where optimized designs are carried over from one subprocess to the next and the fidelity of the used analysis code is increased. Since CPU-time increases with fidelity, such a procedure helps to cut down the overall effort for the whole design process. However, low correlation between the different codes may mislead the optimization. In order to avoid such a misleading, information from higher-fidelity calculations may be propagated back to the early design phases. Such an approach will be demonstrated for the low-fidelity, but fast 1D compressor optimization where basic aerodynamic properties for the entire compressor are computed only along the midline of the compressor annulus based on assumptions and simple correlations, e.g., regarding profile losses. To account for higher-order effects, these assumptions are replaced by higher-fidelity 2D aerodynamic blade information deduced from surrogate models.*

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