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turbulence ingestion fan noise predictions using an advanced
turbulence correlation model

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The generation of sound by an isolated rotating blade row results from the interaction of the blades with turbulence in the approach flow. The relationship between the unsteady velocity field and the sound produced can be expressed directly in terms of the two point velocity correlation function of the approach flow field. It is often assumed that the turbulent flow can be approximated by a number of simplifying assumptions, such as homogeneous, isotropic flow. However, in the frequency range of interest for a number of applications these assumptions are not valid, and their use can lead to significant errors in the prediction of generated sound. The present work will describe a method for using advanced models of two-point velocity correlations and outline new experimental results that validate this approach.