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Combating shock waves: A study of shock wave cancellation mechanisms within linear turbine blade cascades[1] JORGE NUNEZ, VERONICA ELIASSON, UCSD — Prior research has established that unsteady shock wave interactions on turbine blades negatively impact the fatigue life and performance of gas turbines. Current technology in gas turbines mitigates negative effects on turbine blades by way of cooling mechanisms. However, recent inventions seek to eliminate the adverse influence that unsteady shock wave interactions have on turbine blades by cancelling incident shock waves in gas turbines. The goal of this study is to ascertain the efficacy of shock cancellation mechanisms in gas turbines at preventing incident shock waves from reflecting off the turbine blades. A study of shock wave cancellation in linear turbine blade cascades has been performed to analyze the performance of shock wave cancelling mechanisms. CFD simulations are compared to shock tube experiments featuring high-speed schlieren photography and pressure measurements of unsteady shock wave impacts on linear turbine blade cascades. Different shock wave cancelling designs has been investigated and the benefits and drawbacks of the chosen designs will be discussed.

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