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SMA in Jet Engines and Turbomachinery: Explorative Investigation of Monolithic NiTiX Blades

As of today, SMA have not yet enabled widespread breakthroughs in aircraft propulsion, stationary energy production, or turbomachinery in general. Reasons for this are manifold and involve factors of technology, certification, and economy. From the multitude of technical obstacles, the occurring temperatures are especially significant and quickly rule out any SMA composites involving polymers.

This presentation publishes first results of an original study of monolithic NiTiX blades for turbomachinery. Compressor blades are investigated for optimization potential by introducing morphing capability. Valuable geometric degrees of freedom are paid for by borderline difficulties on the material side. Structural and functional stability, creep behavior, and two-way shape memory training procedures of the blades are among the major problems that would need to be overcome in the future. Conceptual and experimental results of low TRL are presented.