Optimization of the non-axisymmetric stator casing of a 1.5 stage axial turbine

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Highlights

• A novel surface definition is used to design the non-axisymmetric stator casing of a 1.5 stage axial turbine.

• A newly formulated guide groove approach is shown effective for limiting secondary flow interactions.

• Computer-based optimization of the surface topology was demonstrated using APOW.

• Useful performance gains are achieved at design, +0.69% in stage isentropic efficiency and -3.88% in row total pressure loss.

• Effective strong secondary flow conditioning produces a 0.73% efficiency gain off-design.