CLAIMS

We claim:

1. A cantilevered airfoil, comprising:

an airfoil having a body section and a tip, the body section extending in a first direction that is angled relative to a radial direction, the tip of the airfoil angled radially in a second direction relative to the body section;

wherein the airfoil extends from a casing; and

wherein the cross-sectional thickness of the airfoil gradually decreases moving away from the casing.

2. The cantilevered airfoil of claim 1, wherein the tip is configured to seal against a seal land that rotates relative to the airfoil in a rotational direction.

3. The cantilevered airfoil of claim 1, wherein the airfoil has a lean that is from -9 to +10 degrees.

4. The cantilevered airfoil of claim 1, wherein the first direction includes a circumferential component that is opposite a rotational direction, and the second direction includes a circumferential component that is the same as the rotational direction.

5. The cantilevered airfoil of claim 4, wherein the body section is secured to a casing, and an angle between the first direction and the casing is from 0 to 52 degrees.

6. The cantilevered airfoil of claim 4, wherein the tip extends from the body section in a second direction, and an angle between the second direction and a seal land is from 32 to 58 degrees.

7. The cantilevered airfoil of claim 1, wherein the first direction extends through a centroid of a radially outermost section of the airfoil, and the second direction extends through a centroid of a radially innermost section of the airfoil.

8. The cantilevered airfoil of claim 1, wherein the cantilevered airfoil has a tip dihedral angle.

9. The cantilevered airfoil of claim 8, wherein the tip dihedral angle is from 0 to 45 degrees.

10. The cantilevered airfoil of claim 1, wherein the tip is coated with an insulative coating, an abradable coating, or both.

11. A gas turbine engine, comprising:

an array of cantilevered airfoils, each of the cantilevered airfoils having a body section and a tip, the body sections extending in a first direction that is angled relative to a radial direction, the tip of the airfoil angled radially in a second direction relative to the body section,

a seal land, wherein the cantilevered airfoils are configured to rotate relative to the seal land;

wherein the airfoil extends from a casing; and

wherein the cross-sectional thickness of the airfoil gradually decreases moving away from the casing.

12. The gas turbine engine of claim 11, a geared architecture rotatably coupling a fan drive turbine and a fan to rotate the fan at a different speed than the fan drive turbine.

13. The gas turbine engine of claim 11, wherein the cantilevered airfoils each have a lean that is from -9 to +10 degrees.

14. The gas turbine engine of claim 11, wherein the first direction includes a circumferential component that is opposite the rotational direction, and the second direction includes a circumferential component that is the same as the rotational direction.

15. The gas turbine engine of claim 11, wherein the first direction extends through a centroid of a radially outermost section of the airfoil, and the second direction extends through a centroid of a radially innermost section of the airfoil.

16. The gas turbine engine of claim 11, wherein the cantilevered airfoil has a tip dihedral angle.

17. The gas turbine engine of claim 11, wherein the tip is coated with an insulative coating, an abradable coating, or both.

18. A method of tuning a cantilevered airfoil, comprising:

providing a cantilevered airfoil having a body section and a tip, the body sections extending in a first direction that is angled relative to a radial direction, the tip of the airfoil angled radially in a second direction relative to the body section;

wherein the airfoil extends from a casing; and

wherein the cross-sectional thickness of the airfoil gradually decreases moving away from the casing.

19. The method of claim 18, including rotating a seal land relative to the cantilevered airfoil.

20. The method of claim 18, wherein the first direction includes a circumferential component that is opposite a rotational direction, and the second direction includes a circumferential component that is the same as the rotational direction.

CLAIMS

1. A cantilevered airfoil, comprising:

an airfoil having a body section and a tip, the body section extending in a first direction that is angled relative to a radial direction, the tip of the airfoil angled radially in a second direction relative to the body section;

a centroid at the radially outermost section of the airfoil is circumferentially offset from a centroid at the radially innermost section of the airfoil such that the airfoil has a lean relative to the radial direction,

wherein the airfoil extends from a casing; and

wherein the cross-sectional thickness of the airfoil gradually decreases moving away from the casing, wherein a centroid at the

2. The cantilevered airfoil of claim 1, wherein the tip is configured to seal against a seal land that rotates relative to the airfoil in a rotational direction.

3. The cantilevered airfoil of claim 1, wherein the lean of the airfoil is from -9 to +10 degrees.

4. The cantilevered airfoil of claim 1, wherein the first direction includes a circumferential component that is opposite a rotational direction which the seal land rotates relative to the airfoil, and the second direction includes a circumferential component that is the same as the rotational direction.

5. The cantilevered airfoil of claim 4, wherein the body section is secured to a casing, and an angle between the first direction and the casing is from 0 to 52 degrees.

6. The cantilevered airfoil of claim 4, wherein the tip extends from the body section in a second direction, and an angle between the second direction and a seal land is from 32 to 58 degrees.

7. The cantilevered airfoil of claim 1, wherein the first direction extends through the centroid of the radially outermost section of the airfoil, and the second direction extends through the centroid of the radially innermost section of the airfoil.

8. The cantilevered airfoil of claim 1, wherein the cantilevered airfoil has a tip dihedral angle.

9. The cantilevered airfoil of claim 8, wherein the tip dihedral angle is from 0 to 45 degrees.

10. The cantilevered airfoil of claim 1, wherein the tip is coated with an insulative coating, an abradable coating, or both.

11. A gas turbine engine, comprising:

an array of cantilevered airfoils, each of the cantilevered airfoils having a body section and a tip, the body sections extending in a first direction that is angled relative to a radial direction, the tip of the airfoil angled radially in a second direction relative to the body section,

a seal land, wherein the cantilevered airfoils are configured to rotate relative to the seal land;

a centroid at the radially outermost section of the airfoil is circumferentially offset from a centroid at the radially innermost section of the airfoil such that the airfoil has a lean relative to the radial direction,

wherein the airfoil extends from a casing; and

wherein the cross-sectional thickness of the airfoil gradually decreases moving away from the casing.

12. The gas turbine engine of claim 11, a geared architecture rotatably coupling a fan drive turbine and a fan to rotate the fan at a different speed than the fan drive turbine.

13. The gas turbine engine of claim 11, wherein the cantilevered airfoils each have a lean that is from -9 to +10 degrees.

14. The gas turbine engine of claim 11, wherein the first direction includes a circumferential component that is opposite the rotational direction which the seal land rotates relative to the airfoil, and the second direction includes a circumferential component that is the same as the rotational direction.

15. The gas turbine engine of claim 11, wherein the first direction extends through a centroid of a radially outermost section of the airfoil, and the second direction extends through a centroid of a radially innermost section of the airfoil.

16. The gas turbine engine of claim 11, wherein the cantilevered airfoil has a tip dihedral angle.

17. The gas turbine engine of claim 11, wherein the tip is coated with an insulative coating, an abradable coating, or both.

18. A method of tuning a cantilevered airfoil, comprising:

providing a cantilevered airfoil having a body section and a tip, the body sections extending in a first direction that is angled relative to a radial direction, the tip of the airfoil angled radially in a second direction relative to the body section;

a centroid at the radially outermost section of the airfoil is circumferentially offset from a centroid at the radially innermost section of the airfoil such that the airfoil has a lean relative to the radial direction,

wherein the airfoil extends from a casing; and

wherein the cross-sectional thickness of the airfoil gradually decreases moving away from the casing.

19. The method of claim 18, including rotating a seal land relative to the cantilevered airfoil.

20. The method of claim 18, wherein the first direction includes a circumferential component that is opposite a rotational direction which the seal land rotates relative to the airfoil, and the second direction includes a circumferential component that is the same as the rotational direction.