CLAIMS

What is claimed is:

1. A method of managing a gas turbine engine variable area fan nozzle, comprising the steps of:

evaluating an icing condition input to determine the likelihood of ice presence; and

altering a variable area fan nozzle position if ice is likely present or actually present.

2. The method according to claim 1, wherein the evaluating step includes using an algorithm that relies upon one or more icing condition inputs from at least one of a temperature sensor, air speed and a humidity sensor.

3. The method according to claim 1, comprising the step of altering the variable area fan nozzle position includes adjusting a fan nacelle exit area in response to an altered variable area fan nozzle position schedule.

4. The method according to claim 3, wherein the adjusting step includes translating flaps to selectively block a vent in the fan nacelle, and the icing condition relates to ice present or likely present in an area of the vent.

5. The method according to claim 4, wherein the variable area fan nozzle position schedule corresponds to the flaps at least partially open at air speeds below 0.55 Mach, and the altering step includes closing the flaps below 0.55 Mach.

6. The method according to claim 5, wherein the variable area fan nozzle position schedule corresponds to the flaps at least partially open at air speeds below 0.50 Mach, and the altering step includes closing the flaps below 0.50 Mach.

7. The method according to claim 6, wherein the flaps are fully open below 0.38 Mach in an unaltered variable area fan nozzle position schedule.

8. The method according to claim 1, wherein the gas turbine engine comprises:

a fan arranged in a fan nacelle including a flap configured to be movable between first and second positions;

an actuator operatively coupled to the flap;

a compressor section fluidly connected to the fan, the compressor comprising a high pressure compressor and a low pressure compressor;

a combustor fluidly connected to the compressor section;

a turbine section fluidly connected to the combustor, the turbine section comprising:

a high pressure turbine coupled to the high pressure compressor via a shaft; and

a low pressure turbine.

9. The method according to claim 8, wherein the gas turbine engine is a high bypass geared aircraft engine having a bypass ratio of greater than about six (6).

10. The method according to claim 8, wherein the gas turbine engine includes a Fan Pressure Ratio of less than about 1.45.

11. The method according to claim 8, wherein the low pressure turbine has a pressure ratio that is greater than about 5.

12. A gas turbine engine comprising:

a fan nacelle including a flap configured to be movable between first and second positions;

an actuator operatively coupled to the flap; and

a controller configured to evaluate an icing condition to determine the likelihood of ice presence, and the controller configured to alter a variable area fan nozzle position schedule if ice is likely present or actually present by providing a command to the actuator to adjust the flap from the first position to the second position.

13. The gas turbine engine according to claim 12, wherein the first position is open and the second position is closed.

14. The gas turbine engine according to claim 12, comprising a geared architecture coupled between a low speed spool and a fan, the fan arranged within the fan nacelle.

15. The gas turbine engine according to claim 14, comprising:

a compressor section fluidly connected to the fan, the compressor comprising a high pressure compressor and a low pressure compressor;

a combustor fluidly connected to the compressor section;

a turbine section fluidly connected to the combustor, the turbine section comprising:

a high pressure turbine coupled to the high pressure compressor via a shaft; and

a low pressure turbine.

16. The gas turbine engine according to claim 15, wherein the gas turbine engine is a high bypass geared aircraft engine having a bypass ratio of greater than about six (6).

17. The gas turbine engine according to claim 15, wherein the gas turbine engine includes a Fan Pressure Ratio of less than about 1.45.

18. The gas turbine engine according to claim 15, wherein the low pressure turbine has a pressure ratio that is greater than about 5.

19. The gas turbine engine according to claim 12, wherein the variable area fan nozzle position schedule corresponds to the flaps at least partially open at air speeds below 0.55 Mach, and the command includes closing the flaps below 0.55 Mach.

20. The gas turbine engine according to claim 19, wherein the flaps are fully open below 0.38 Mach in an unaltered variable area fan nozzle position schedule.

CLAIMS

What is claimed is:

1. A method of managing a gas turbine engine variable area fan nozzle, comprising the steps of:

operating a variable area fan nozzle according to a first operating schedule;

evaluating an icing condition input to determine the likelihood of ice presence;

altering the first operating schedule, which provides a variable area fan nozzle position, if ice is likely present or actually present to provide an icing operating schedule different than the first operating schedule;

adjusting the variable area fan nozzle position according to the icing operating schedule;

a fan arranged in a fan nacelle including a flap configured to be movable between first and second positions;

an actuator operatively coupled to the flap; and

the gas turbine engine includes a Fan Pressure Ratio of less than about 1.45.

2. The method according to claim 1, wherein the evaluating step includes using an algorithm that relies upon one or more icing condition inputs from at least one of a temperature sensor, air speed and a humidity sensor.

3. A method of managing a gas turbine engine variable area fan nozzle, comprising the steps of:

operating a variable area fan nozzle arranged downstream from a fan that is in a fan nacelle, the variable area fan nozzle operated according to a first operating schedule;

evaluating an icing condition input to determine the likelihood of ice presence;

altering the first operating schedule, which provides a variable area fan nozzle position, if ice is likely present or actually present to provide an icing operating schedule different than the first operating schedule; and

adjusting the variable area fan nozzle according to the icing operating schedule, and the adjusting step includes translating flaps to selectively block a vent in the fan nacelle, and the icing condition relates to ice present or likely present in an area of the vent.

4. The method according to claim 3, wherein the first operating schedule corresponds to the flaps at least partially open at air speeds below 0.55 Mach, and the altering step includes closing the flaps below 0.55 Mach as part of the icing operating schedule.

5. The method according to claim 4, wherein the first operating schedule corresponds to the flaps at least partially open at air speeds below 0.50 Mach, and the altering step includes closing the flaps below 0.50 Mach as part of the icing operating schedule.

6. The method according to claim 5, wherein the flaps are fully open below 0.38 Mach in the first operating schedule.

7. The method according to claim 1, wherein the gas turbine engine comprises:

a compressor section fluidly connected to the fan, the compressor comprising a high pressure compressor and a low pressure compressor;

a combustor fluidly connected to the compressor section;

a turbine section fluidly connected to the combustor, the turbine section comprising:

a high pressure turbine coupled to the high pressure compressor via a shaft; and

a low pressure turbine.

8. The method according to claim 1, wherein the gas turbine engine is a high bypass geared aircraft engine having a bypass ratio of greater than about six (6).

9. The method according to claim 7, wherein the low pressure turbine has a pressure ratio that is greater than about 5.

10. A gas turbine engine comprising:

a fan nacelle including a flap configured to be movable between first and second positions;

an actuator operatively coupled to the flap; and

a controller configured to operate the flap according to a first schedule, to evaluate an icing condition to determine the likelihood of ice presence, and the controller configured to alter the first operating schedule, which provides a variable area fan nozzle position, if ice is likely present or actually present by providing a command to the actuator in accordance with an icing operating schedule that is different than the first operating schedule to adjust the flap from the

first position to the second position according to the icing operating schedule, and the first operating schedule corresponds to the flaps at least partially open at air speeds below 0.55 Mach, and the command includes closing the flaps below 0.55 Mach as part of the icing operating schedule.

11. The gas turbine engine according to claim 10, wherein the first position is open and the second position is closed.

12. The gas turbine engine according to claim 10, comprising a geared architecture coupled between a low speed spool and a fan, the fan arranged within the fan nacelle.

13. The gas turbine engine according to claim 12, comprising:

a compressor section fluidly connected to the fan, the compressor comprising a high pressure compressor and a low pressure compressor;

a combustor fluidly connected to the compressor section;

a turbine section fluidly connected to the combustor, the turbine section comprising:

a high pressure turbine coupled to the high pressure compressor via a shaft; and

a low pressure turbine.

14. The gas turbine engine according to claim 12, wherein the gas turbine engine is a high bypass geared aircraft engine having a bypass ratio of greater than about six (6).

15. A gas turbine engine comprising:

a fan nacelle including a flap configured to be movable between first and second positions;

an actuator operatively coupled to the flap;

a controller configured to operate the flap according to a first operating schedule, to evaluate an icing condition to determine the likelihood of ice presence, and the controller configured to alter the first operating schedule, which provides a variable area fan nozzle position, if ice is likely present or actually present by providing a command to the actuator in accordance with an icing schedule that is different than the first operating schedule to adjust the flap from the first position to the second position according to the icing operating schedule; and

the gas turbine engine includes a Fan Pressure Ratio of less than about 1.45.

16. The gas turbine engine according to claim 13, wherein the low pressure turbine has a pressure ratio that is greater than about 5.

17. The gas turbine engine according to claim 10, wherein the flaps are fully open below 0.38 Mach in the first operating schedule.

18. The gas turbine engine according to claim 10, wherein the first operating schedule corresponds to a non-icing operating schedule.