We Claim:

1. A refrigerant vapor compression system comprising:

a compressor for compressing a refrigerant, the compressor having a suction port and a discharge port;

a refrigerant heat rejection heat exchanger operatively coupled downstream to the discharge port of the compressor;

a refrigerant heat absorption heat exchanger operatively coupled downstream to the refrigerant heat rejection heat exchanger;

a compressor suction inlet line connecting the refrigerant heat absorption heat exchanger to the suction port of the compressor;

an adiabatic expansion device operatively coupled to the suction inlet line;

a sensor operatively coupled to the suction inlet line for measuring a superheat value of the refrigerant; and

a controller in communication with the sensor, the controller configured to operate the refrigerant vapor compression system in a first mode when a pressure of the refrigerant downstream of the adiabatic expansion device is greater than a threshold value, and operate the refrigerant vapor compression system in a second mode when the pressure of the refrigerant downstream of the adiabatic expansion device is less than the threshold value;

wherein the compressor continues to operate in both modes.

2. The refrigerant vapor compression system of claim 1, wherein the adiabatic expansion device is a suction modulation valve.

3. The refrigerant vapor compression system of claim 1, wherein the second mode comprises increasing the superheat value of the refrigerant in the suction inlet line.

4. The refrigerant vapor compression system of claim 1, wherein the second mode comprises reducing a pressure upstream of the adiabatic expansion device until a pressure downstream of the adiabatic expansion device is above the triple point pressure of the refrigerant.

Claims

1. A refrigerant vapor compression system comprising:

a compressor for compressing a refrigerant, the compressor having a suction port and a discharge port;

a refrigerant heat rejection heat exchanger operatively coupled downstream to the discharge port of the compressor;

a refrigerant heat absorption heat exchanger operatively coupled downstream to the refrigerant heat rejection heat exchanger;

a compressor suction inlet line connecting the refrigerant heat absorption heat exchanger to the suction port of the compressor;

an adiabatic expansion device operatively coupled to the suction inlet line;

a sensor operatively coupled to the suction inlet line for measuring a superheat value of the refrigerant; and

a controller in communication with the sensor, the controller configured to operate the refrigerant vapor compression system in a first mode when a pressure of the refrigerant downstream of the adiabatic expansion device is greater than a threshold value, and operate the refrigerant vapor compression system in a second mode when the pressure of the refrigerant downstream of the adiabatic expansion device is less than the threshold value, the threshold value indicative of a pressure at which expansion across the adiabatic expansion device would result in formation of solid-phase refrigerant; and

wherein the compressor continues to operate in both modes.

2. The refrigerant vapor compression system of claim 1, wherein the adiabatic expansion device is a suction modulation valve.

3. The refrigerant vapor compression system of claim 1, wherein the second mode comprises increasing the superheat value of the refrigerant in the suction inlet line.

4. The refrigerant vapor compression system of claim 1, wherein the second mode comprises reducing a pressure upstream of the adiabatic expansion device until a pressure downstream of the adiabatic expansion device is above the triple point pressure of the refrigerant.