**Claims**

1. A method for ascertaining at least one attribute of pressure vessel wall, the method comprising:

while a pressure vessel, which comprises a wall having an outer surface and an inner surface, is operating:

ascertaining a current wavelength shift of a first fiber Bragg grating (FBG) sensor disposed at a first outer surface location on the pressure vessel;

ascertaining a current thickness of the wall at the first outer surface location by:

computing a vector based on a time series of the current wavelength shift, or a derivative of the time series, or a derivative of the current wavelength shift;

providing the vector to a predetermined regression model; and

using the regression model, ascertaining the current thickness of the wall; and

ascertaining a current condition of the wall at the first outer surface location by:

based on the time series of the current wavelength shift, computing a current summation of absolute changes thereof and/or a current gradient thereof; and

classifying the current condition as an overthinning condition if the current summation, or the gradient, or a combination of the current summation and the gradient satisfies a threshold condition which is selected from the group consisting of at least one previous summation of absolute changes in previous wavelength shift of the first FBG sensor, at least one previous gradient of previous wavelength shift of the first FBG sensor, at least one predetermined threshold value, and a predetermined threshold line, wherein the overthinning condition identifies an impending failure of the pressure vessel.

2. The method of claim 1, wherein the time series of the current wavelength shift is obtained from an initial time series of the current wavelength shift by averaging the initial time series, or filtering the initial time series using a median filter, or filtering the initial time series using a low-pass filter.

3. The method of any one of claim 1 to claim 2, wherein computing a vector based on a time series of the current wavelength shift, or a derivative of the time series, or a derivative of the current wavelength shift comprises:

removing at least one unwanted component from the current wavelength shift by computing a difference between the current wavelength shift and a reference value which is

either predetermined or ascertained from a reference wavelength shift of a reference sensor disposed at the first or another outer surface location of the pressure vessel; and

ascertaining the difference as the derivative of the current wavelength shift.

4. The method of claim 3, wherein the at least one unwanted component is selected from the group consisting of thermal strain on the outer surface of the pressure vessel, pressure of fluid flowing in the pressure vessel, and vibration on the outer surface of the pressure vessel.

5. The method of claim 3 or claim 4, wherein the reference sensor is disposed in a direction which is substantially orthogonal to a direction of the first FBG sensor.

6. The method of claim 3 or claim 4, wherein the reference sensor is disposed in a substantially longitudinal direction of the pressure vessel and wherein the first FBG sensor is disposed in a substantially radial direction of the pressure vessel.

7. The method of any one of claim 3 to claim 6, wherein the reference sensor includes an optical sensor, or a thermocouple, or a vibration sensor.

8. The method of any one of claim 1 to claim 7, wherein the first outer surface location is provided at a bend or U-bend of the pressure vessel.

9. The method of claim 8, wherein the bend includes an angle which is acute, orthogonal, obtuse, or about 45 degrees.

10. The method of any one of claim 1 to claim 9, wherein the pressure vessel is a tube.

11. A system for ascertaining at least one attribute of pressure vessel wall, the system comprising:

a plurality of fiber Bragg grating (FBG) sensors which are disposed at outer surface locations on a pressure vessel which comprises a wall having an outer surface and an inner surface, wherein the FBG sensors include a first FBG sensor disposed at a first outer surface location on the pressure vessel; and

a computing processor which is communicably coupled via a communication network to the FBG sensors, wherein the computing processor is configured to:

while the pressure vessel is operating:

ascertain a current wavelength shift of the first FBG; and

ascertain a current thickness of the wall at the first outer surface location by:

computing a vector based on a time series of the current wavelength shift, or a derivative of the time series, or a derivative of the current wavelength shift;

providing the vector to a predetermined regression model; and

using the regression model, ascertaining the current thickness of the wall; and

based on the time series of the current wavelength shift, compute a current summation of absolute changes thereof and/or a current gradient thereof; and

classify the current condition as an overthinning condition if the current summation, or the gradient, or a combination of the current summation and the gradient satisfies a threshold condition which is selected from the group consisting of at least one previous summation of absolute changes in previous wavelength shift of the first FBG sensor, at least one previous gradient of previous wavelength shift of the first FBG sensor, at least one predetermined threshold value, and a predetermined threshold line, wherein the overthinning condition identifies an impending failure of the pressure vessel.

12. The system of claim 11, wherein the computing processor is further configured to:

obtain the time series of the current wavelength shift from an initial time series of the current wavelength shift by averaging the initial time series, or filtering the initial time series using a median filter, or filtering the initial time series using a low-pass filter.

13. The system of any one of claim 11 to claim 12, wherein the computing processor is further configured to:

remove at least one unwanted component from the current wavelength shift by computing a difference between the current wavelength shift and a reference value which is either predetermined or ascertained from a reference wavelength shift of a reference sensor disposed at the first or another outer surface location on the pressure vessel; and

ascertain the difference as the derivative of current wavelength shift.

14. The system of claim 13, wherein the at least one unwanted component is selected from the group consisting of thermal strain on the outer surface of the pressure vessel, pressure of fluid flowing in the pressure vessel, and vibration on the outer surface of the pressure vessel.

15. The system of claim 13 or claim 14, wherein the reference sensor is disposed in a direction which is substantially orthogonal to a direction of the first FBG sensor.

16. The system of claim 13 or claim 14, wherein the reference sensor is disposed in a substantially longitudinal direction of the pressure vessel and wherein the first FBG sensor is disposed in a substantially radial direction of the pressure vessel.

17. The system of any one of claim 13 to claim 16, wherein the reference sensor includes an optical sensor, or a thermocouple, or a vibration sensor.

18. The system of any one of claim 11 to claim 17, wherein the first outer surface location is provided on a bend or U-bend on the pressure vessel.

19. The system of claim 18, wherein the bend includes an angle which is acute, orthogonal, obtuse, or about 45 degrees.

20. The system of any one of claim 11 to claim 19, wherein the pressure vessel is a tube.

21. A non-transitory computer-readable medium having computer-readable code executable by at least one processor to perform the method according to any one of claims 1 to 10.