

Sub-Surface Patterning for Diffraction-Based Strain Measurement and Damage Detection in Structures

Abstract of the Disclosure

Systems and methods for assessing strain in structural components are disclosed. Structural components may have geometric patterns of grooves within the structural component, with the grooves in the geometric pattern each having a groove width. The method may include projecting beams of electromagnetic (EM) energy through the structural component to the geometric pattern of grooves to create diffracted beams of EM energy that are reflected from or transmitted through the geometric pattern of grooves and have diffracted wavelengths indicating changes in the groove widths due to strain caused when the structural component is exposed to environmental conditions, detecting the diffracted wavelength of the diffracted beams, and correlating the diffracted wavelengths of the diffracted beams to the strain in the structural components.

Fig. 1