

## *Optical crack width measurement on high-speed composite rotors*

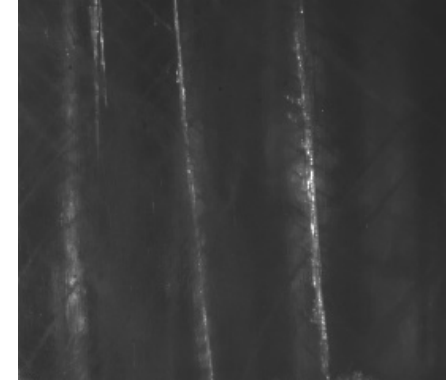
### Motivation

The development of highly efficient turbomachines is crucial for the reduction of CO<sub>2</sub> emission in air traffic. Due to their high specific stiffness and tensile strength, fiber reinforced polymers (FRP) are predestined for the construction of efficient large diameter high-speed fan blades. However, their complex mechanical behavior impedes failure prediction. To investigate the correlation between damage state and structure dynamic behavior, FRP discs are accelerated to rotational speeds above 200 Hz inside a test rig. The damage state manifests itself by the formation and the propagation of cracks on the rotor surface.

The behavior of the cracks and their influence on the adjacent strain field shall be investigated by a camera based approach.



Rolls Royce UltraFan engine [RR19]



Cracks on surface of a composite specimen

### Tasks

- Adaptation of an optical setup for triggered image acquisition on fast moving rotors
- Determination of an uncertainty budget
- Crack width and strain field measurement on a high speed composite rotor

### Key words

Optical full field measurement, pulsed illumination, experiments, MATLAB

### Contact

- M.Sc. Julian Lich, BAR 26, Tel. 463-33455, E-Mail: [julian.lich@tu-dresden.de](mailto:julian.lich@tu-dresden.de)
- Internet: <http://tu-dresden.de/et/mst>

[RR18] rolls-royce.com/media/press-releases/2019/25-02-2019-rr-ultrafan-one-step-closer-as-advanced-low-pressure-system-alps-testing-gets-underway.aspx (05.03.2019)