Docket #: S20-017

Dynamic Thin Film Measurements Using Hyperspectral Imaging

Researchers in the Fuller group have designed a platform and method for measuring the thickness profiles of dynamic thin liquid films at high frequencies. The key steps in the new method called as dynamic hyperspectral interferometry are as follows. Snapshots of the evolving liquid film are continuously acquired using a hyperspectral camera, and are broken down and reconstructed into hyperspectral cubes. The algorithm then performs background subtraction, cropping, intensity correction and normalization to yield an initial thickness profile. Finally, a spatial optimization algorithm corrects any incorrectly assigned points to enforce C0 spatial continuity and return a film thickness profile. Applications include measuring tear film profiles over contact lenses as a potential ophthalmology clinic diagnostic tool, and measuring the thickness profiles of bubbles for evaluating foam stability in protein formulations, lubricants, or personal care products.

Stage of Research

- Proof of Concept

Applications

- **Ophthalmology clinic diagnostic for tear films on contact lenses**
- Foam stability measurement: R&D tool for lubricants, personal care products and protein formulation

Advantages

- **Robust and automated**
- High dynamic range: up to 1.2 µm and further development expected extend this to >3.5 µm)

- High frequency : upto 10 Hz and further development is expected to extend this to >25 Hz.
- High spatial resolution and measurement area: >5000 points in a region of 0. 5 x 0.5 mm.

Publications

- Suja et al. Scientific Reports (2020) "Hyperspectral imaging for dynamic thin film interferometry"

Patents

- Published Application: 20210264582
- Issued: 11,580,631 (USA)

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