Proposal for Technical Contribution, CIRP 2021 Winter Meeting – STC S

Title of presentation

On the role of surface microstructure in modeling and rendering of material appearance

Contributors

Jeppe Revall Frisvad

Abstract

The appearance of an object is more than shaded visualization of its 3D shape. The appearance of every macroscopic surface position we observe is a result of light scattering in the microgeometry of the object. This presentation is on the influence of the microgeometry on the scattered light reaching an observer. If we are to use microgeometry in simulation to render photorealistic images of digital twins of products, we need a practical way to represent it. We can feasibly solve Maxwell's equations in a small microgeometry of say three microns cubed, but full digital representation of the microgeometry and calculation of light scattering for an object measured in centimeters is infeasible. There is currently no standard for full digital representation of the appearance of a physical object. In addition, there is a significant lack of validation of the actual photorealism of computer graphics rendering techniques. With a focus on the role of the surface microstructure, I will in this presentation discuss the challenges in specification and predictive simulation of the appearance of physical objects.

Presenter Information

Jeppe Revall Frisvad
Affiliation: Technical University of Denmark
Email: jerf@dtu.dk