

# 3D surface dielectric imaging

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## Project outline

The project will be a part of ongoing research at the WMG on the development of the 3D surface scanning system for imaging of the complex dielectric permittivity and magnetic permeability of objects (composite materials) with a curved surface. The proof-of-concept of the dielectric imaging system was published in Scientific Report (DOI:10.1038/s41598-017-02176-3). The principle of imaging is based on the measurement of the resonance of the split ring probe when it is in contact with the surface. Because the error in the measurements and accuracy depend on the position of the slit of the probe on the surface, the *aim of the project* is to develop the z-axis system for precision positioning of the dielectric probe.

Particular tasks you are expected to achieve within a 3 month MSc project:

1. develop an approach for the position of the probe onto the surface to minimise the air gap between the surface considering the slit geometry and surface curvature—a surface  $(x, y, z)$  profile will be obtained by the optical profilometer;
2. design (CAD) and make (3D-print) the robotic mechanical system for precise positioning of the dielectric probe onto the surface;
3. evaluate your approach and design experimentally.

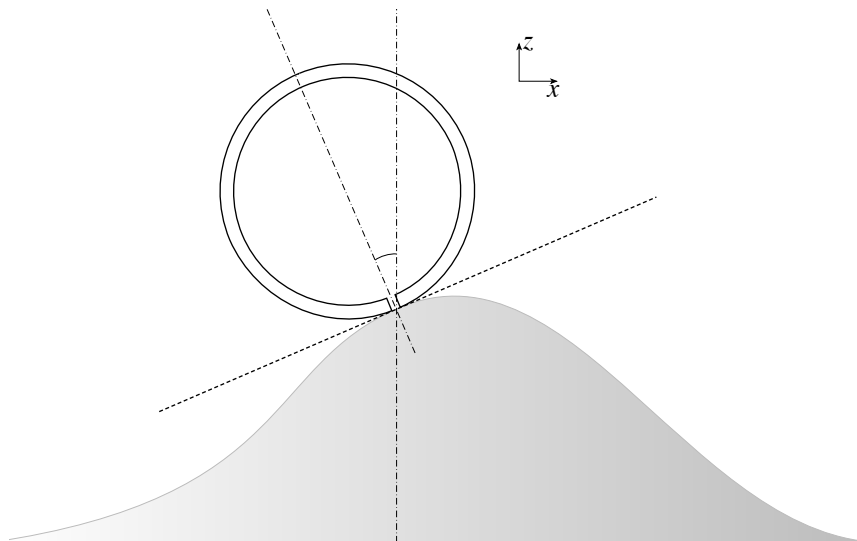


Figure 1: *The schematic representation of a curved surface and a Split Ring Resonator dielectric probe in the contact of the surface.*

For further details and any questions please don't hesitate to contact me.