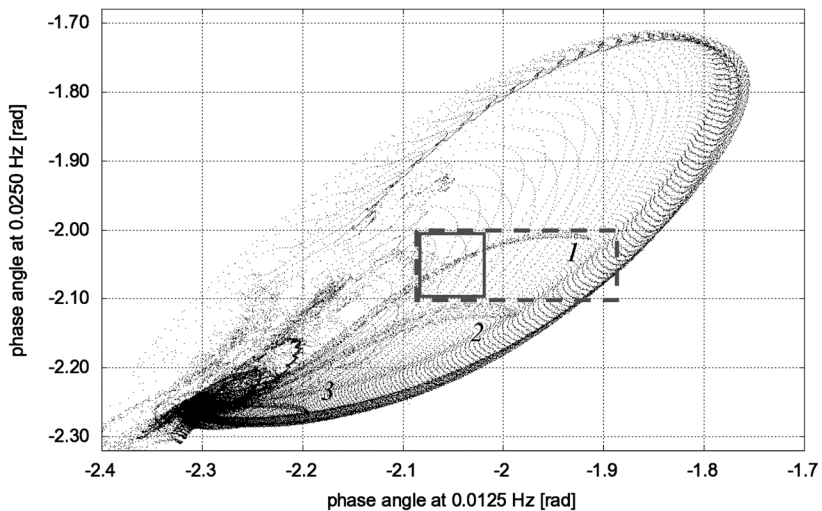
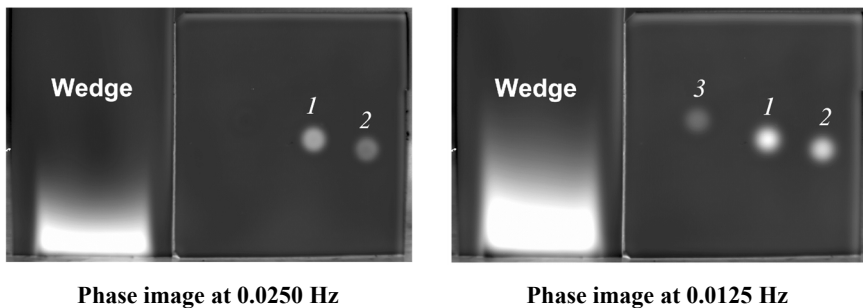


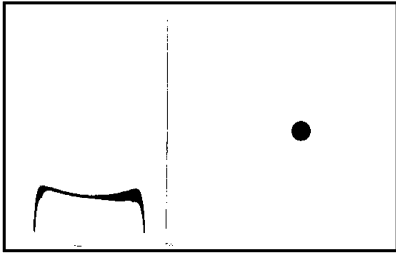
1.5.20. FEATURE-EXTRACTION FROM LOCKIN-THERMOGRAPHY PHASE-IMAGES

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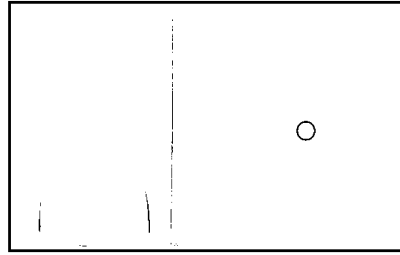
Optically excited lockin-thermography gets more and more common as it is robust as well as easily manageable. The full potential of this method is not used though, if only one lockin-frequency is taken into account. More information can be gained by correlating two or more measurements. This allows to gather information on features like the kind of defect, thickness of the specimen, properties of boundary layers, lateral heat flow et cetera. Certain defects are correlated to specific patterns in a scatterplot, akin to a fingerprint. Specimens with and without a certain feature can be distinguished more easily using suitable filters. This is apparently of importance for automated defect detection.



Scatterplot of the two phase images



Here only the data out of the dashed region is displayed



Only data out of the solid line rectangle is used and therefore the pure lateral heat flux is displayed

This paper covers feature-extraction using scatterplots as shown in the results below. A wedge was used to measure the depth dependence of the phase angle for two lockin-frequencies. According to the thermal wave theory the scatterplot of the wedge shows a closed (nearly elliptical) curve. Another specimen positioned next to the wedge contains flat bottom holes in different depths drilled from the rear side. The lateral heat flux at the drillings results in a different shape of the correlated scatterplot curves, and therefore can be extracted from phase images in order to reveal hidden structures and defects.