

Millimeter wave and terahertz imaging for inspections in the field of cultural heritage

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Due to the good transparency of many dielectric materials for millimeter and terahertz waves, imaging with these electromagnetic waves offers many application potentials for examinations of cultural objects complementary to established techniques such as ultrasonic testing. The measurement technique enables contact-free imaging of internal structures such as marble or plaster figures and can therefore also be used for objects with sensitive surfaces. Wood grains and damage caused by woodworms can also be captured with ease. The strong absorption of terahertz waves by polar liquids, such as water, enables moisture analysis, whereas metallic structures reflect the measuring signal completely, which allows for example the inspection of reinforcements in sculptures. At the same time, the non-destructive technology is harmless to health and provides the capability for mobile use even in harsh environments. Based on a Fraunhofer project in the field of cultural heritage, this contribution presents the measurement systems, the results of measurement campaigns on relevant objects and initial findings on the planned mobile use of the technology for the investigation of cultural assets. Based on a Fraunhofer project in the field of cultural heritage, this contribution presents the measurement systems, the results of measurement campaigns on relevant objects and initial findings on the planned mobile use of the technology for the investigation of cultural assets.