

Inspection of dielectric composites with millimeter and terahertz waves

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Millimeter and terahertz waves have proven to be highly suitable for non-destructive testing of dielectric composite structures and respective measurements systems provide the capability for inspections with single side access. A wide range of different system concepts have been developed in order to address different applications. Besides a comprehensive overview of different application scenarios a special focus is given on the realization of a 3D imaging system for industrial radome inspection. The system has been designed to be operated within a machining center for radome manufacturing. In order to provide the required flexibility in respect to image resolution and penetration depth, we developed a system, which combines two frequency-modulated continuous-wave terahertz sensing units, operating in adjacent frequency ranges, from 70 to 110 GHz and from 110 to 170 GHz, respectively. The collinear arrangement of the measurement paths does not only allow to simultaneously gather terahertz images in two different frequency ranges, but also to perform data fusion for additional images with increased depth resolution. We also highlight our developments of mobile testing systems, which provide a great potential for inspections of relevant structures in field use. Furthermore, we report about our progress on the certification of our technology in connection with the UK National Aerospace NDT Board.