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Enhanced coherent terahertz beam with a photoconductive antenna containing a chaotic shape electrodes[1] DONG HO WU, CHRISTOPHER KIM, BENJAMIN GRABER, Naval Research Laboratory — Photoconductive antenna is one of the most popular methods to produce a broadband terahertz beam. Our recent experiments indicate that a photoconductive antenna containing a pair of parallel micro-strip-line electrodes produces both incoherent and coherent terahertz beam. When we drive the antenna with a low bias voltage and a weak femto-second laser power, it produces mostly coherent terahertz beam. However, as the bias voltage and/or the femto-second laser power increase, the incoherent terahertz beam strength increases exponentially with the bias voltage.[1] When the bias voltage and/or the femto-second laser power exceeds critical values, heat associated with the incoherent beam eventually leads to a catastrophic antenna failure, resulting in a permanent damage on the antenna.[2] In order to improve our photoconductive antenna we have implemented a chaotic geometry in the photoconductive antenna's electrodes. Our experimental results show that the new antenna produces substantially more coherent terahertz beam and much less incoherent terahertz beam. We will present the details of our experimental results and discuss the merits of new antenna design. We will also examine some theory to understand our experimental results.

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