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Wind-turbine lightning protection: Electrostatic models are not sufficient RICHARD SONNENFELD, New Mexico Tech Physics and Langmuir Laboratory, SIDHARTH ARUNKUMAR, ASHOK GHOSH, New Mexico Tech Mechanical Engineering — Wind turbines made of non-conducting composites currently use lightning receptors to reduce damage. Attempts to understand receptor effectiveness have focused on electrostatic models of $\vec{E}$-field around the turbine in the presence of an incoming lightning leader. We created such an electrostatic model using COMSOL, to test the hypothesis in the wind community that a receptor with a larger static field at this "striking distance" is a more effective lightning interceptor. While we modeled field for a real turbine, we could not do a lab test of same. Instead, a circuit board (PCB) with copper stripes (cathodes) of varied spacing (s) was fabricated. ($1.1\ cm < s < 7.2\ cm$). 6500 sparks were emitted with a 100 kV Marx generator and an anode to stripe gap (g) $1 < g < 5\ cm$. Attachment points of the sparks to the cathode stripes were recorded with high-speed video as the position of the anode was varied. Attachment did NOT generally proceed to the highest $\vec{E}$ location. For $g <= s$, sparks almost exclusively struck the nearest stripe. For $g \simeq 2s$, sparks hit adjacent stripes. Kinks in the videoed sparks suggest an anode streamer triggering an upward cathode streamer. Correct models must calculate cathode field allowing for presence of the anode leader

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