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Nanosecond repetitively pulsed discharge control of premixed lean methane-air combustion MOON SOO BAK, MARK A. CAPPELLI, Stanford University — Two-dimensional kinetic simulations are carried out to investigate the effects of the discharge repetition rate and pulse width of nanosecond repetitively pulsed discharges on stabilizing premixed lean methane-air combustion. The repetition rate and pulse widths are varied from 10 kHz to 50 kHz and from 9 ns to 2 ns respectively, while the total power is held constant. The lower repetition rates, because of their higher pulse energies, produce a larger fraction of radicals such as O, H, and OH. Surprisingly, however, the effect on flame stabilization is found to be essentially the same for all of the tested repetition rates. The shorter pulse width is found to favor the production of species in higher electronic states, but the varying effects on stabilization is also found to be small. Our results indicate that the total deposited power is the critical element that determines the extent of stabilization over this range of discharge properties studied.

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