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Density and lifetime evaluation of weakly ionized plasma for laser-triggered lightning by means of laser absorption MICHITERU YAMAURA, Institute for Laser technology — The potential ability of lasers to control lightning can be improved by using a train of pulses with sub-millisecond separations [1-2]. Laser-triggered experiments in a small-scale (10 mm gap) atmospheric discharge facility show that the triggering is dramatically enhanced when a five-pulse train of sub-Joule energy is used instead of a single pulse. This effect increases rapidly as the pulse interval is reduced. In order to evaluate the trigger effect quantitatively, the plasma density produced by a pulsed KrF excimer laser with high repetition rate of kHz order was measured by means of laser absorption [3-4]. It appears that at a sub-millisecond pulse interval, sufficient positive and negative ions survive in subsequent pulses, thus enabling easy deionization. Hence, significant plasma build-up occurs from one pulse to the next. However, this persistence of ions would appear to imply that the rate of recombination (effectively a charge transfer between ions) is considerably lower than previously believed.

References

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