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Discharge modes in oil submerged spark gap with gas injection. KUNPENG WANG, XIN TANG, DAVID STAACK[1], Texas AM University — Electrical discharge in submerged spark gap with gas injection was experimentally studied with two different commonly used electric circuits. One RC circuit with constant voltage and a double spark gap circuit were used. The charging time of the RC circuit before breakdown was comparable with the bubble residence time in the spark gap, while the second circuit with double spark gap finished charging and discharging on the second capacitor two orders of magnitude faster than the bubble rising time. Consequently, bubble dynamics are relatively independent of the applied electric field if we use the second circuit. Three different discharge mechanisms were proposed. The first breakdown mechanism is believed to happen in the gas phase only when the entire spark gap was enclosed in a gas bubble. Breakdown occurs first on the electrode tips where a stronger electric field is present. The second discharge mechanism is initiated by contaminates in the liquid. When contaminates get charged from one electrode and move in the electric field towards the second electrode, breakdown happens during this process. The third discharge mechanism we proposed is due to the interactions between either charged bubbles or charged bubbles and electrode.

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