# GENERATION OF AUDIO FREQUENCY PIN-HOLE DISCHARGE IN WATER SOLUTIONS

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The pin-hole discharge is one of suitable configurations allowing electrical discharge generation in liquid. Typically, DC or low frequency (50 Hz) high voltage sources are used in a pulsed or continuous regime [1]. Two of initiated processes, electrolysis and Joule heating, induce a decrease of energy efficiency of such systems [2]. Moreover, the applicability of such power supplies seems to be rather dangerous for handy operating devices. Thus, we have focused on the pin hole discharge generation using an audio frequency power supply.

The presented contribution gives the first results of the pin-hole generation using a high frequency power supply. A batch discharge reactor with total volume of 100 ml was divided by a 0.6 mm thick Shapal ceramic diaphragm with one hole of 0.6 mm diameter. A specially designed power supply based on a resonance circuit (energy was set using frequency in the range of 20–80 kHz) gives sinusoidal high voltage up to 5 kV. The supplied energy was calculated using Lissajouse charts [3] (for a typical example, see Fig. 1) – high voltage was measured by a Tektonix P6005A probe, current was determined from voltage measured on 4 μF capacitance. NaCl solutions with different initial conductivity were used as a conductive liquid in the presented study.

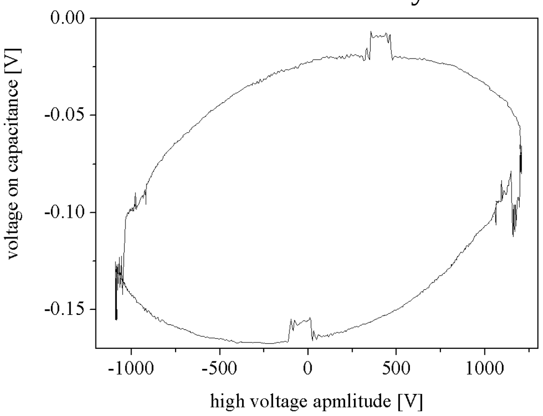


***Fig. 1:*** *Example of Lissajouse chart.*

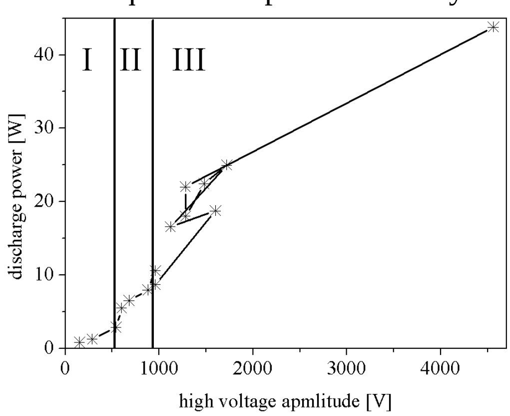


***Fig. 2:*** *Example of discharge generation characteristic (conductivity of 500 μS/cm).*

An example of the discharge generation characteristic is given by Fig. 2. The initial part (I) shows a very slow increase of the discharge power on applied voltage, and it corresponds to ohmic character of the interelectrode system; this means that there is no discharge created. The second part (II) is characterized by a significantly higher power consumption which corresponds to the bubbles formation. Presence of bubbles was also confirmed visually due to significant noise generation caused by their cavitation. Finally, the third part (III) reflects the discharge generation. The chaotic character of experimental points reflects the fact that the discharge is not operating continuously; it is generated inside the bubbles that cavitate and thus the power consumption is strongly dependent on the bubbles dimensions, mainly.

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## References

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