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### **Tutorial on underwater electrical discharges: main features and applications**

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Main features of underwater electrical discharge with short description of models (“bubble”, “explosive emission”, “ionization” and “thermal”), parameters of the discharge (threshold electric field versus polarity, time duration, frequency, pressure, interelectrode gap and area of electrodes, velocity of streamer propagation and density and temperature of the plasma, strong shock waves) and different electrical and optical diagnostics which were used in this research will be shortly reviewed. Such main applications of underwater electrical discharge as electro-hydraulic forming, destruction of rocks, low-inductance water spark gap switches, treatment of pollutants in water and extracorporeal shock wave lithotripsy will be discussed. Finally, results of application of underwater electrical explosion of single wires in nanosecond - microsecond timescales for research related to Equation of State of different materials at extreme conditions and underwater electrical explosion of wire arrays in cylindrical and spherical configurations for generation of converging strong shock waves using moderate high-power generators for research of compressed water at extreme conditions will be presented.