# MODELLING OF ENERGY DEPOSITION FOR LASER-INITIATED MW DISCHARGE

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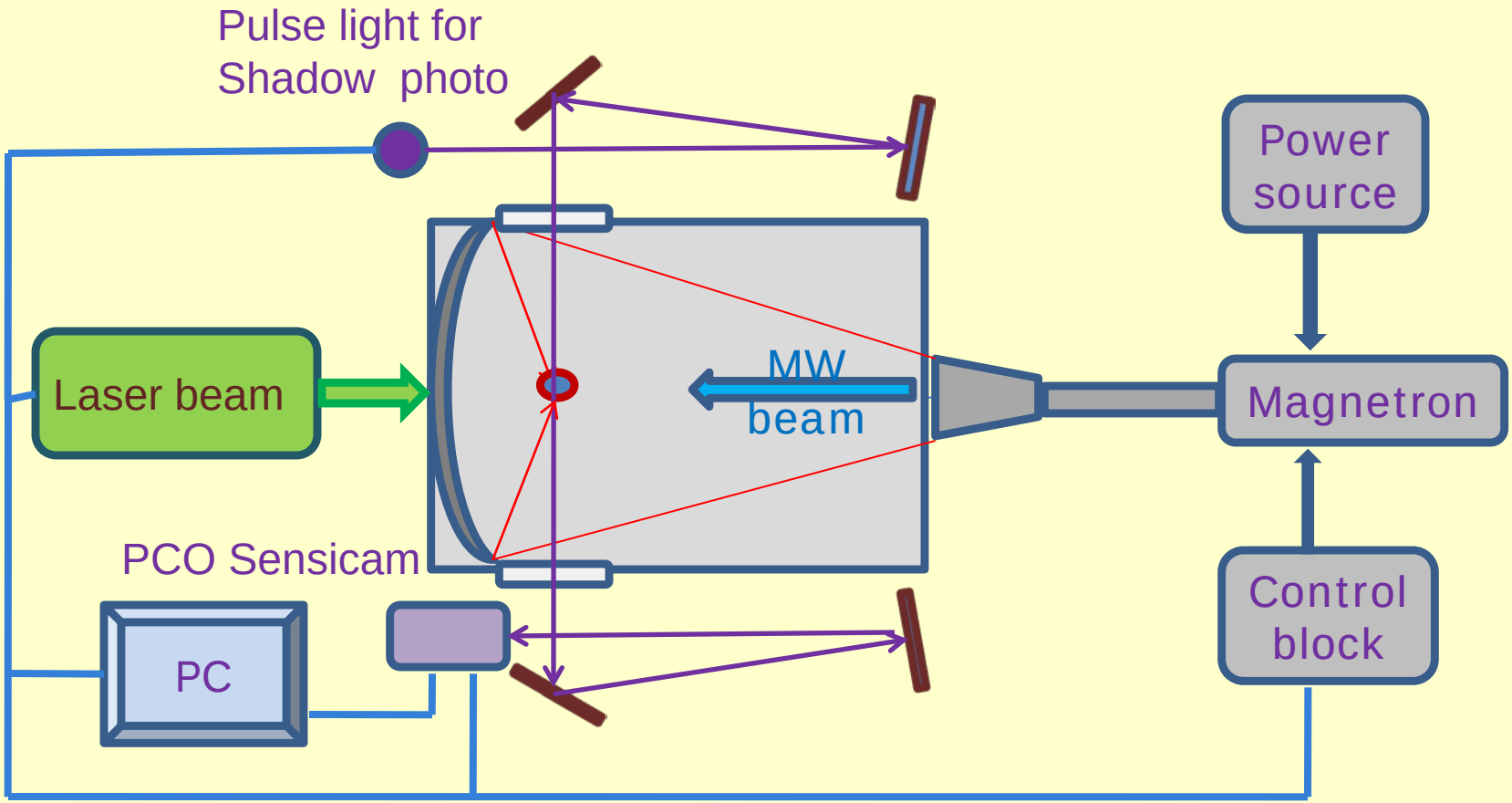
# Main tasks:

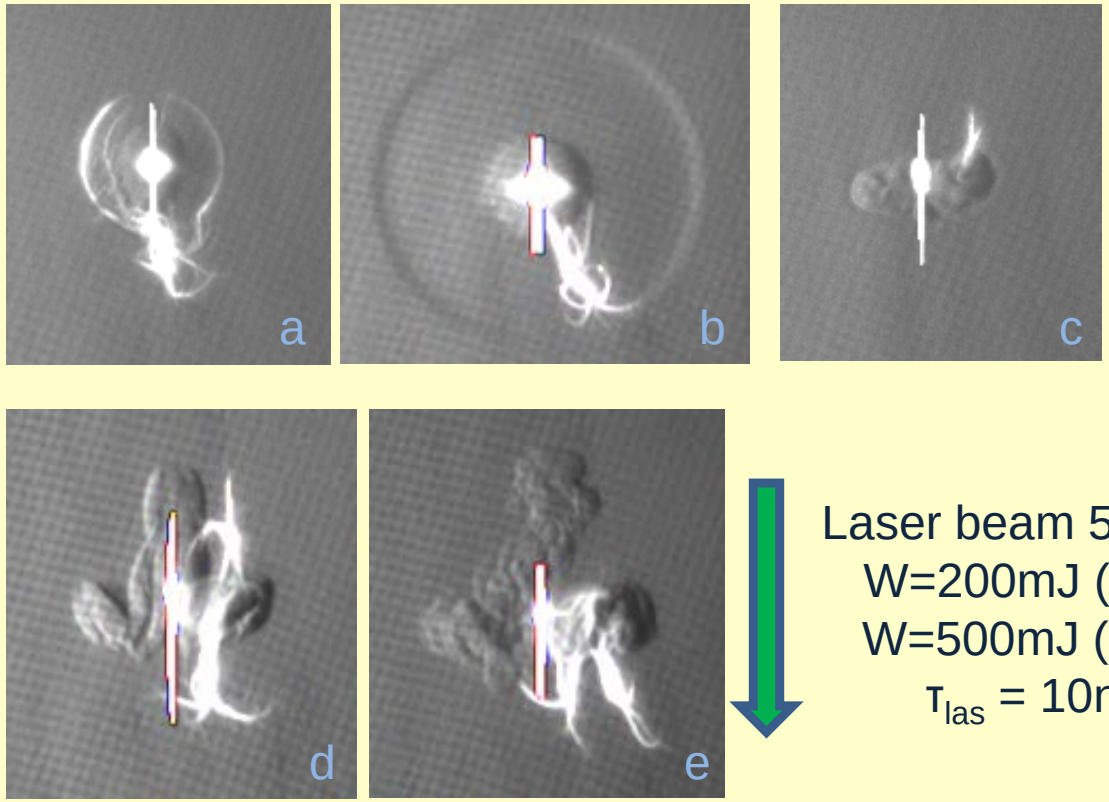
- investigation of LS gas-dynamic processes influence on MWD structure at different MW-LS interaction stage and different air pressure
- study of MWD formation dynamics by Schlieren method
- determination of multipoint MW discharge energy deposition on wave structures of LS




# MW installation scheme

# LS wave and thermal structures and corresponded MW discharges in air

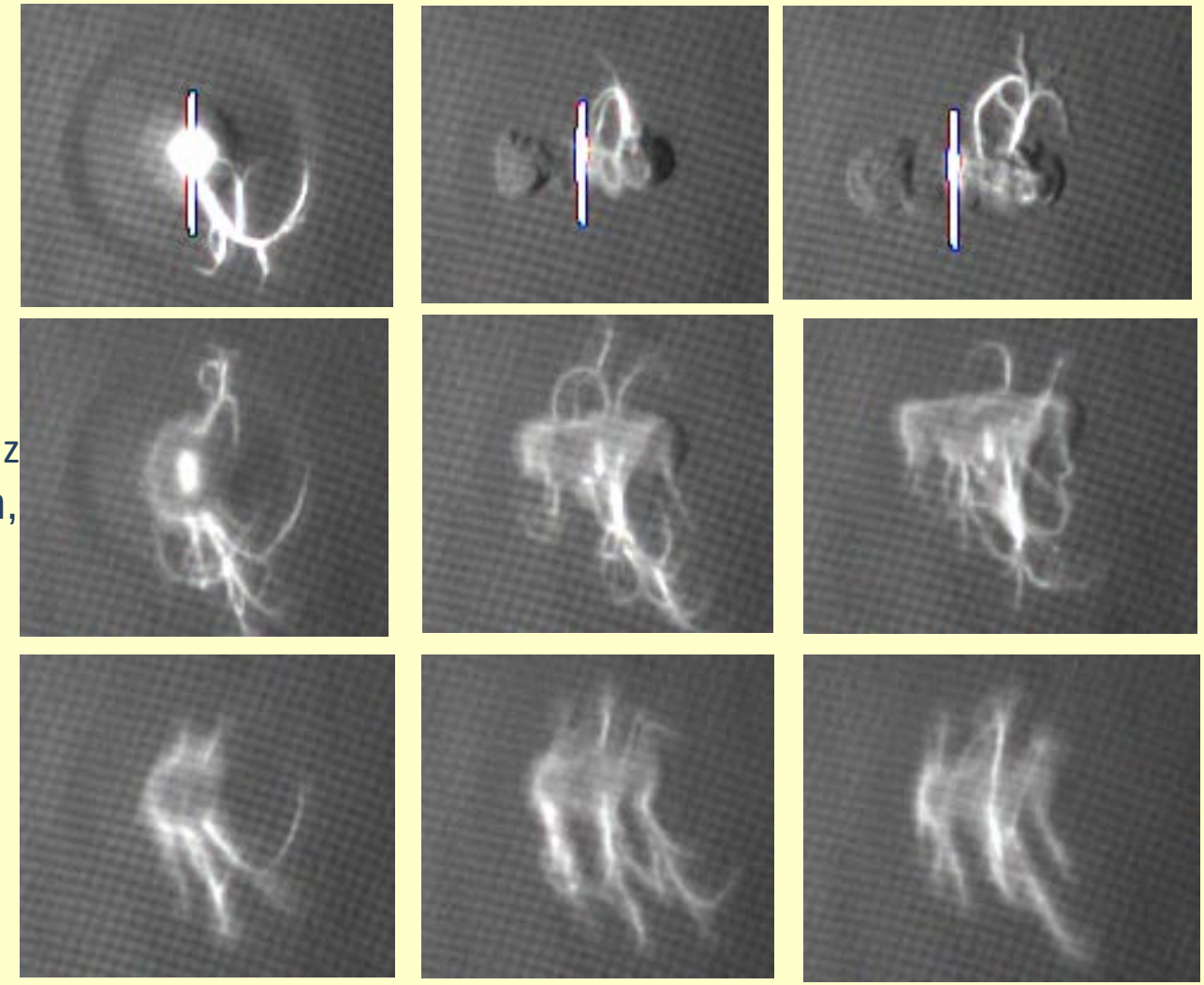
MW
Beam 12 GHz
$E$ = 5 kV/cm,
$\tau_{MW}$ = 4 μs.



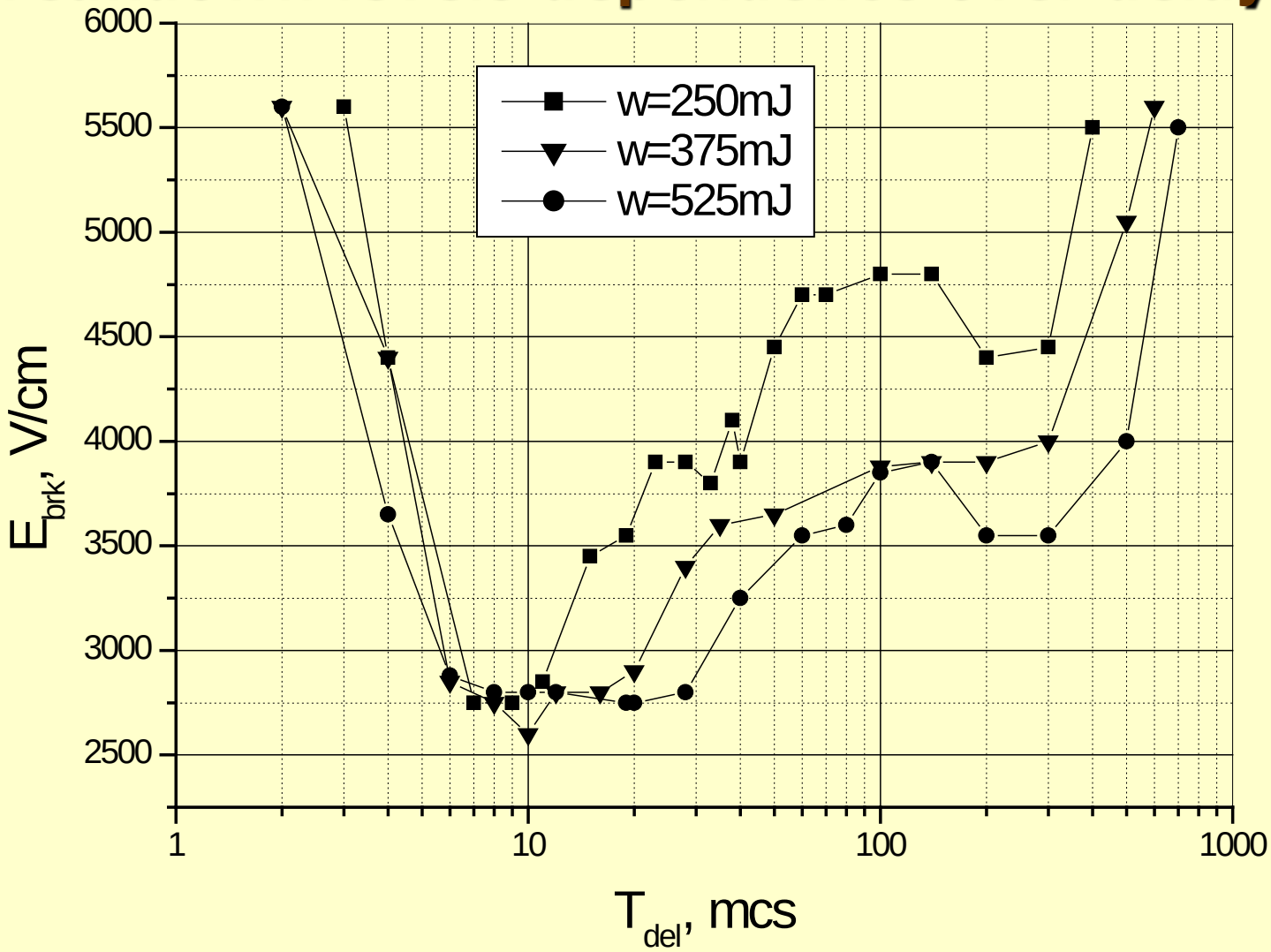

**P=750Torr**

Laser beam 532 nm
W=200mJ (a-c),
W=500mJ (d-e),
$\tau_{las}$ = 10ns.

**Schlieren photo of MW discharge initiated by LS, exposure time 0.5mcs (a-c) and 3,5mcs (d-e). MW – laser delay (mcs): a) 5, b) 20, c) 210, d) 505, e) 964.**

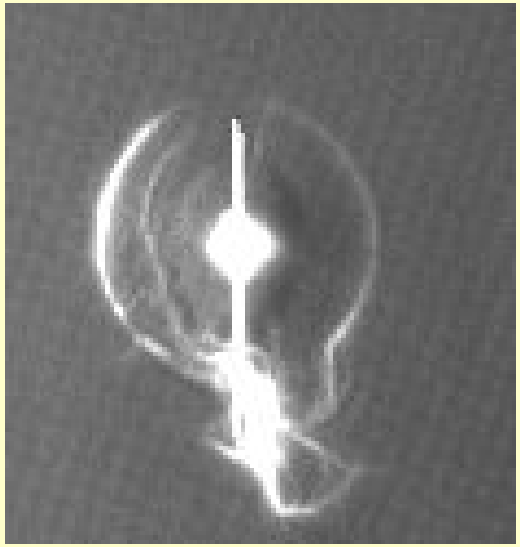

750Torr
Laser beam W=350mJ, τ = 10ns
MW Beam 12 GHz E = 1 kV/cm, τ = 4 μs
300Torr
150Torr
10
300
500mks

# Influence of laser pulse energy on MW breakdown levels dependence over delay time

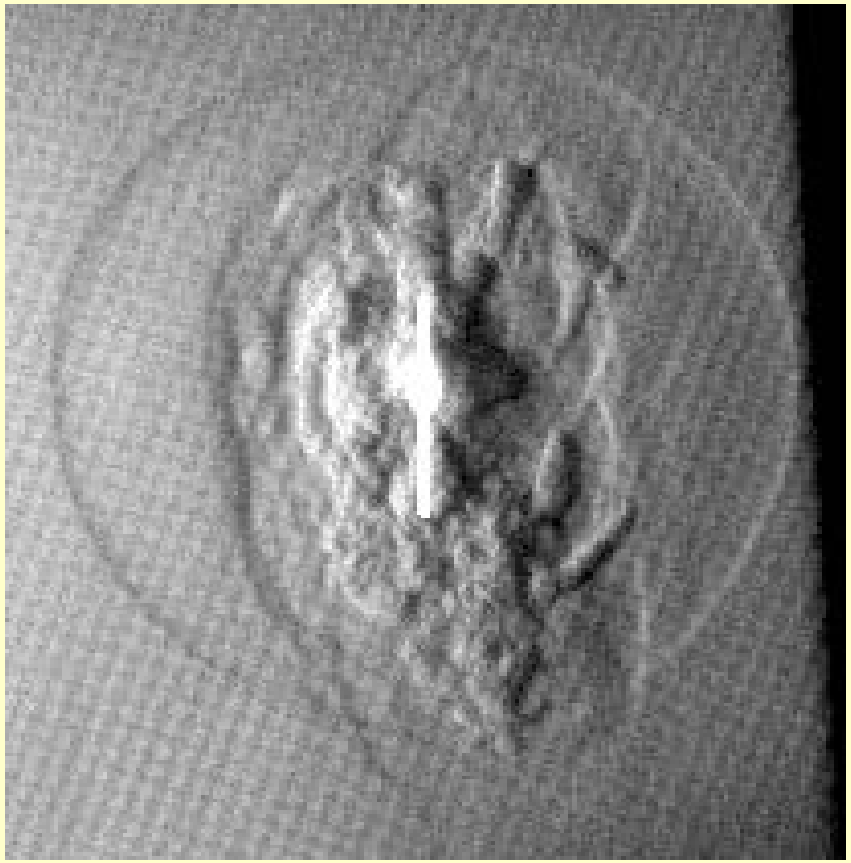


# Multipoint MW energy deposition in LS shack wave structures

MW
Beam 12 GHz
$E$ = 5 kV/cm,
$\tau_{MW}$ = 4 μs

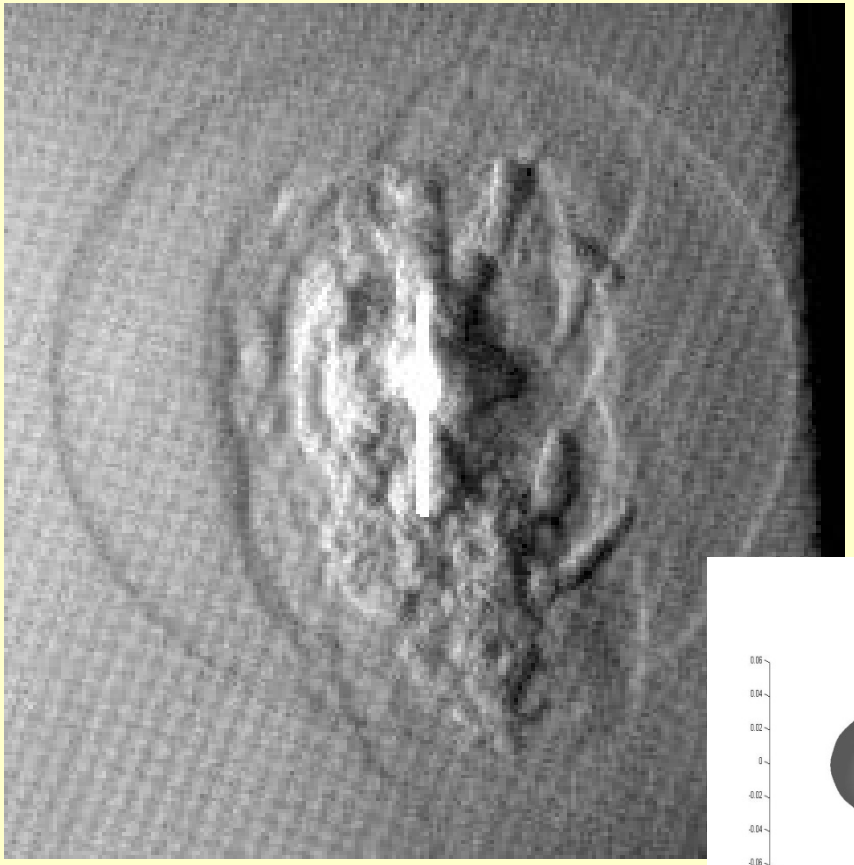


MW Discharge delayed to 4 μs via LS

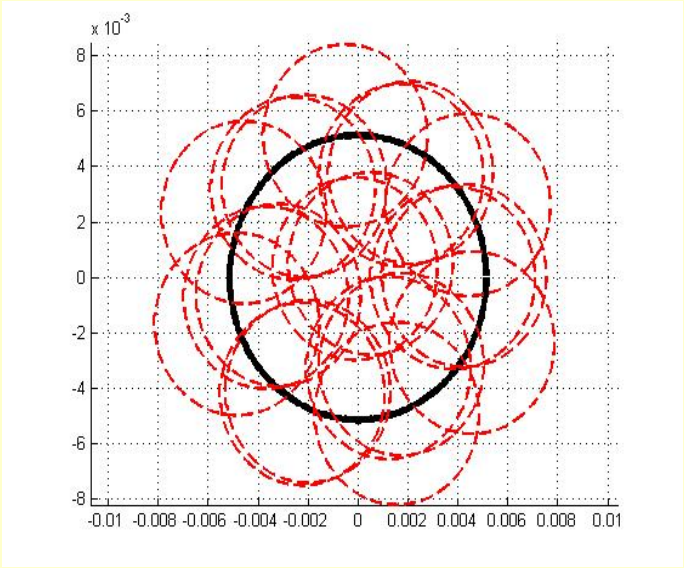


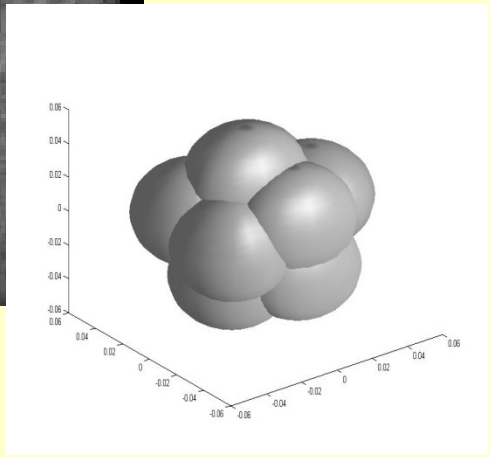
Delay 25 μs

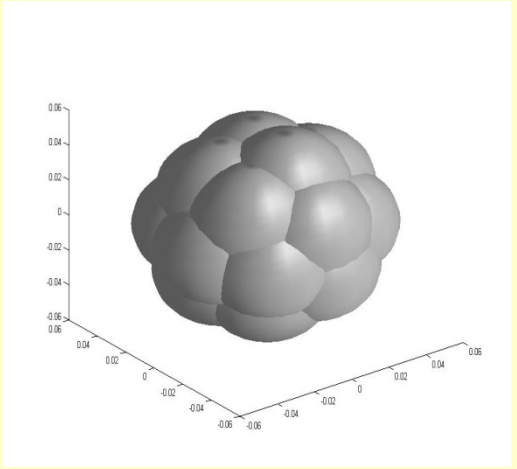
# Modeling of Multipoint MW energy deposition in LS shack wave structures



Delay 25 μs





## Main conclusions:

- Principle stages of MWD formation:

10mcs – MW channels start from poles LS area and very often are developing along SW front;

300mcs–density hole is formed in LS area and is visualized under the MW radiation action; MW channels as a rule are developing from the hole's boundary region;

500mcs – thermal vortex is formed in LS area and MWD takes its configuration

- Under the atmospheric pressure, laser pulse energy 0,5 J, time delay between LS and MW pulse 4-6 μs, laser energy deposition in wave structures of LS approx. 0,1 J :

-15-30 MW multipoint discharges are initiated

-level of each energy deposition 0,01-0,005 J, general MW input - 0,15-0,3 J.

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