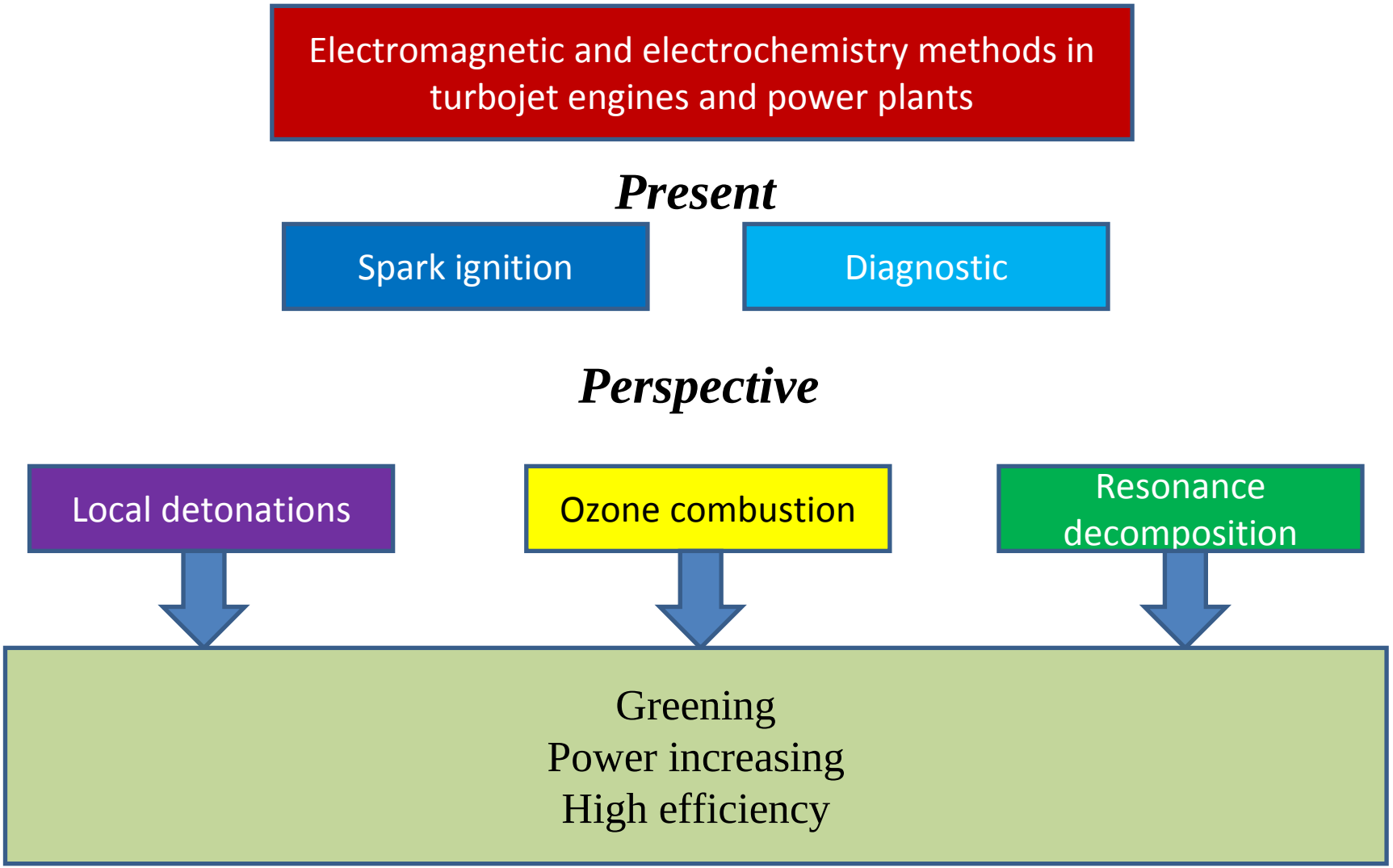
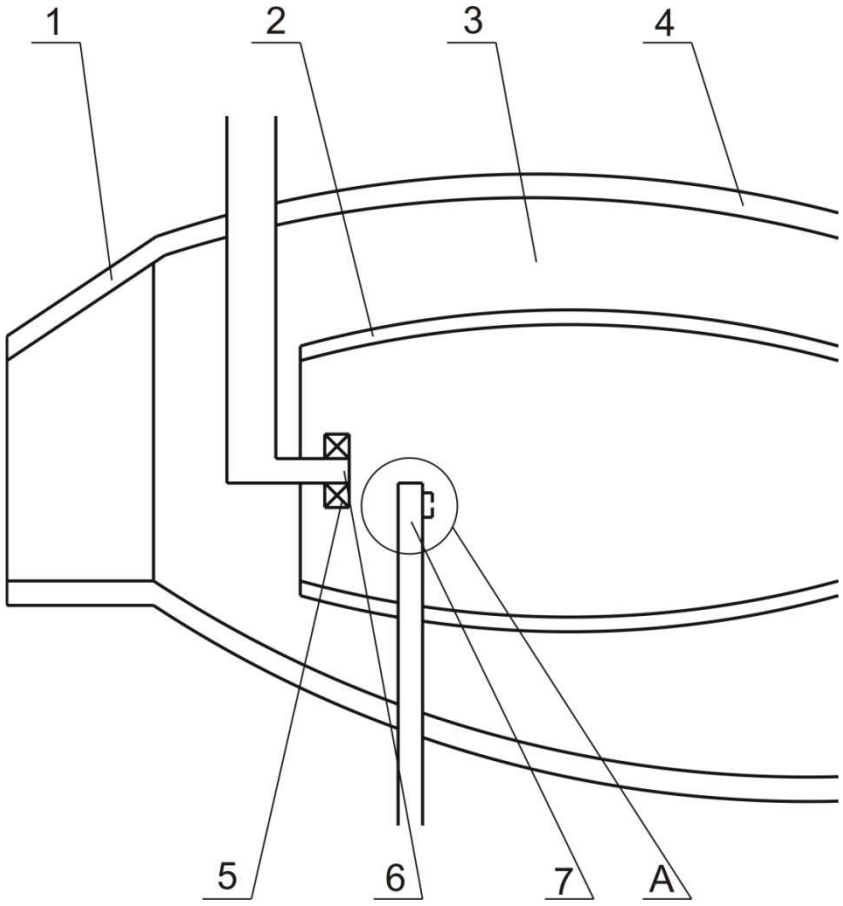
Electrochemistry and electromagnetic

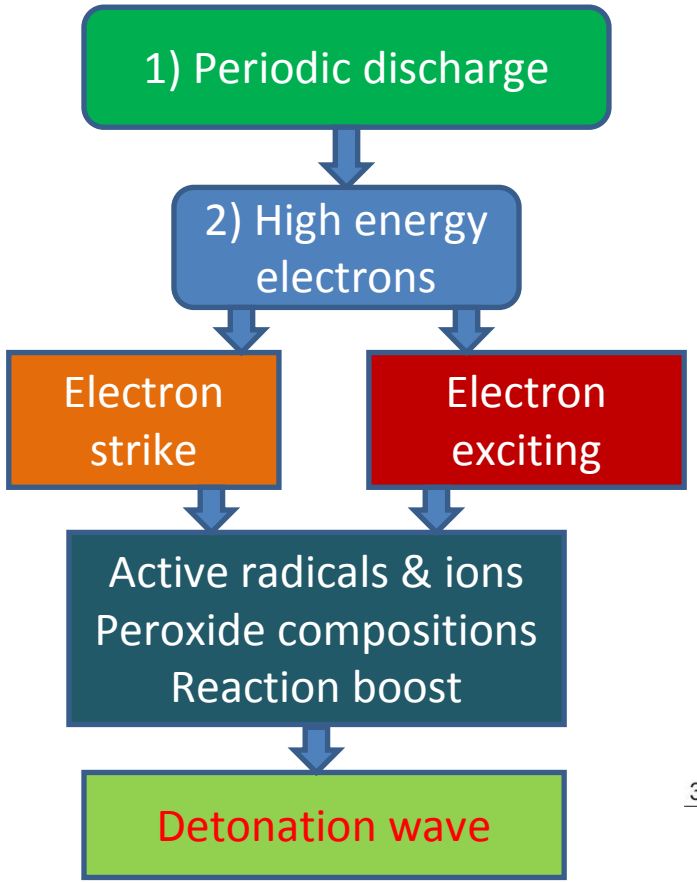


Local detonation – increasing instead of loss

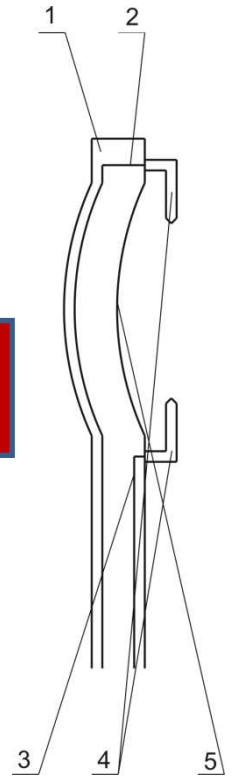
Chamber construction



Mechanism



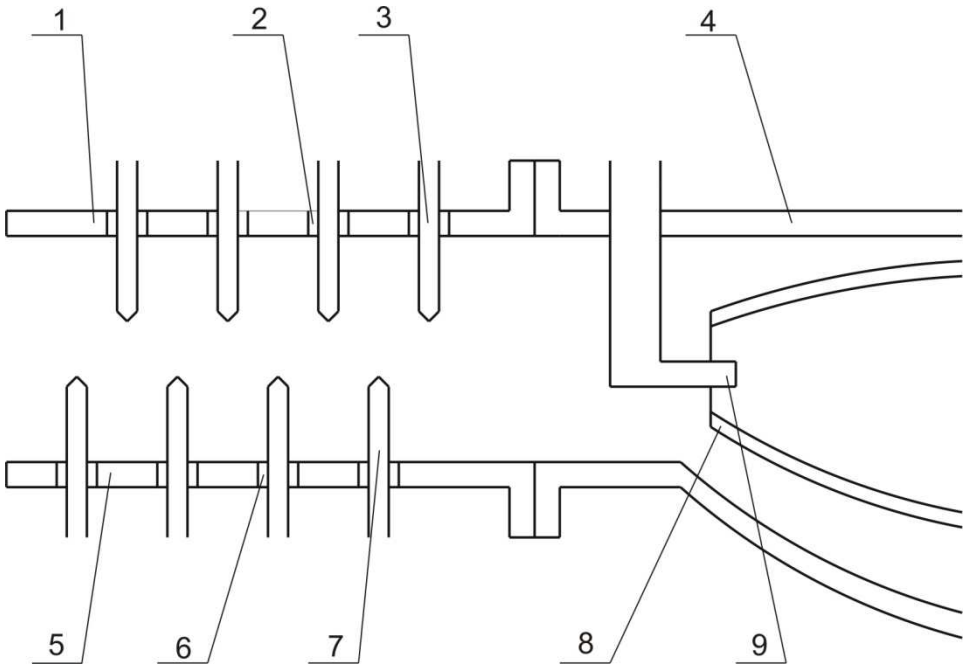
Discharger



Preliminary ozonation – small chamber, big possibilities

Ozone combustion provides multiway “soft-oxidation” reaction with increased speed and efficiency without danger of detonation, vibro-flames and NO_X emission

Chamber construction



Reaction mechanism

Preliminary ozonation

$$O_2 \overset{e^-}{\leftrightarrow} O + O$$

$$O_2 + O \leftrightarrow O_3$$

$$O_2 + O_2 \overset{e^-}{\leftrightarrow} O_3 + O$$

...

Ozone combustion

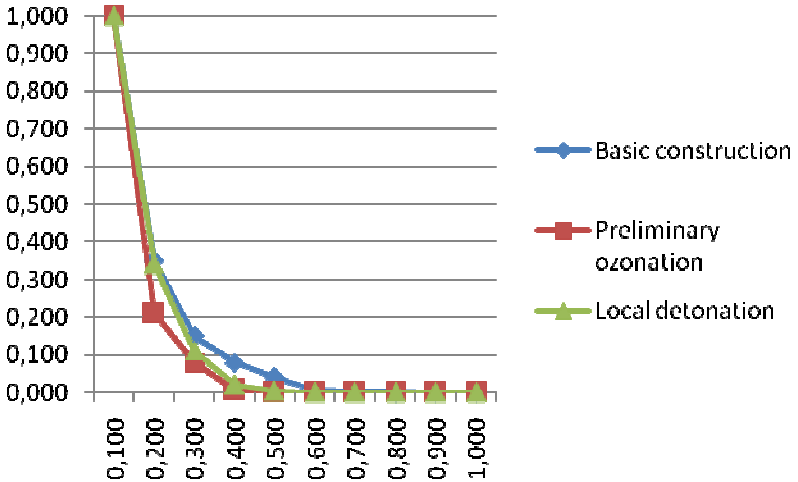
$$O_3 + C_xH_{2x+2} \rightarrow C_xH_{2x+1} + OH + O_2$$

$$CH_3 + O_3 \rightarrow CH_2O + OH + O$$

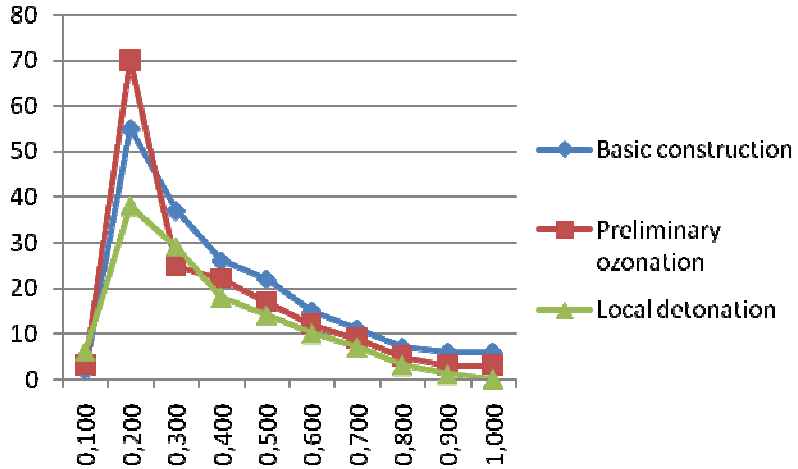
...

Characteristics of modified gas chamber

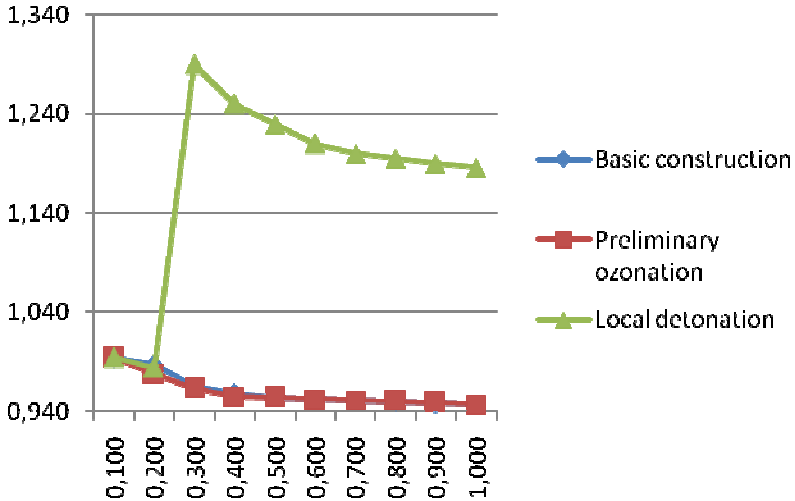
Relative methane concentration



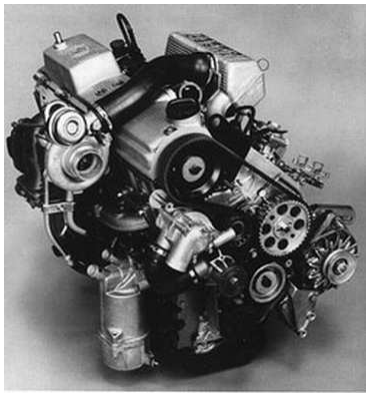
Temperature irregularity



Total pressure loss/increasing



Electromagnetic resonance decomposition of NO_x



Aircraft engines

Gas turbine power plants

Diesel&piston engines

NOx

Acidic destruction of constructive elements

Life threat

Efficiency reduction

Pollution

Present NOx reducing methods

Separated combustion zone

High hydrodynamic losses
Low effective temperature
Complicated construction

Catalytic combustion chamber

Small flow rate
Low effective temperature
Expensive catalysts

Vapor injection

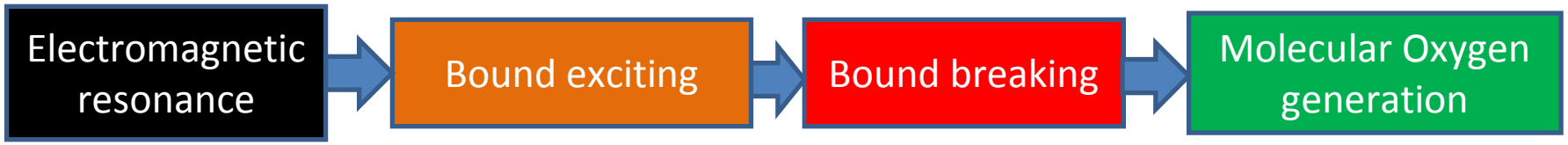
Addition consumables
Inappropriate for aircraft
Water recycling devices

Depleted mixtures

Low effective temperature
Low efficiency
Increased chamber's size

Preliminary restriction of NOx generation
Impossible to reduce existing NOx
Limited applicability

Decomposition mechanism



$$\nu_{ext} = \nu_e$$

$$A_{ext} + A_e \geq \Delta E_n$$

$$N = O \rightarrow N \overset{*}{=} O$$

$$NO \xrightarrow{\vec{E}_1(t)} N + O$$

$$NO_2 \xrightarrow{\vec{E}_2(t)} NO + O$$

$$NO_2 \xrightarrow{\vec{E}_3(t)} N + O + O$$

$$O + O \rightarrow O_2$$

NOx decomposition – benefits without shortcomings

Applicability:

- nozzles, exhausting tubes of jet engines, land-based stations, piston, Diesel, Stirling engines;
- Temperature: 173 – 1400 K;
- Pressure: up to 200 atm;
- Flow rates– unlimited;
- Flow velocity – up to M=3;
- Initial NOx concentration from 10 to 10000 ppm;
- Various initial gas consistence.

Requirements:

- No additional consumables;
- Transient electromagnetic generator that can be mount on main engine shaft;
- Decomposition chamber after/in exhausting nozzle/tube.

Results & benefits:

- Level of NOx reduction: up to 99,95% from initial;
- Independence from the fuel type;
- No parameter fields changing;
- Simple and cheap construction;
- Successful work on all regimes;
- No efficiency penalty;
- Method can be extended on other dangerous exhausting material;
- No additional materials;
- Long lifetime of decomposition devices;
- Easy control & regulation;
- Advancing of any present and close future NOx pollution limits;
- More than 15 billions profits during next 10 years