

## Research program

### ENERGETICS PROCESSES

Research in the field of energy and renewable energy sources, energy processes, energy conversion efficiency, environmental research. Research on energy storage, heat transfer, cavitation, multiphase flow and phase changes in the "smart materials" and "smart technologies" areas for use in buildings and power equipment. Research of cavitation processes in medicine.



#### Research activities

##### ENERGY AND RENEWABLE RESOURCES

- ▶ Solar and wind energy.
- ▶ Research of combustion processes.
- ▶ Energy storage technology.
- ▶ Reliability of power equipment.
- ▶ Research on increasing the efficiency of heat exchangers.
- ▶ Energy savings.

##### TECHNOLOGICAL EQUIPMENT OF BUILDINGS

- ▶ Research in the field of heating and cooling units.
- ▶ Environmental comfort research (internal environmental quality).
- ▶ Research on reducing the energy performance of buildings.

##### MULTIPHASE FLOW

- ▶ Research in the field of new materials and surface modifications regarding current materials to increase their cavitation resistance.
- ▶ Development of measuring method for identification cavitation impact using piezoelectric PVDF sensors. Evaluation of cavitated surfaces by pitting tests and their comparison with measurements by PVDF sensors.
- ▶ Research of interaction concerning cavitation with biological materials. Applied research of the use of ultrasonic cavitation for functionalization of biomaterials and their various forms in medical applications.
- ▶ Research on boiling and condensation.

##### INTENSIFICATION OF HEAT TRANSFER

- ▶ Research in the field of heat transfer during phase changes.
- ▶ Research on influence of physicochemical superficial properties on temperature and momentum boundary layers, research of boundary layer influence.
- ▶ Research on the influence of nanofluids regarding temperature and momentum boundary layers, research on the use of nanofluids for increasing the thermal conductivity of liquids and increasing the heat transfer.
- ▶ Research of thermo-physical properties of substances.

##### MODERN EXPERIMENTAL METHODS

- ▶ Development of Particle Image Velocimetry method for use in the study of multiphase flow.
- ▶ Development of Laser Induced Fluorescence method for measurement of 3D temperature fields.
- ▶ Development of Digital Holography Interferometry to measure temperature fields in liquids, to measure cavitation processes, to measure phase changes in.