Proposed topics of diplomas and intermediate projects - Division of Thermodynamics

	Topic	supervisor	type (I - intermediate, E - engineer's thesis., M -master's thesis,)
1.	Application of chemical reactions in thermal energy storage	prof. dr hab. inż. Piotr Furmański	I
2.	Effect of moisture in porous materials on its thermal properties	prof. dr hab. inż. Piotr Furmański	I
3.	Evaluation of structural defects In materials using infrared technique	prof. dr hab. inż. Piotr Furmański	I
4.	Determination of thermal properties of solids using infrared technique	prof. dr hab. inż. Piotr Furmański	I
5.	Analysis of use of the osmosis phenomenon to generation of useful energy	prof. dr hab. inż. Piotr Furmański	I
6.	Design of a technical blackbody with a large surface area	prof. dr hab. inż. Piotr Furmański	I
7.	Study of thermal radiation interaction with porous materials	prof. dr hab. inż. Piotr Furmański	I
8.	Micro heat engines	prof. dr hab. inż. Piotr Furmański	I
9.	Thermal control of heat in satellites	prof. dr hab. inż. Piotr Furmański	I
10.	Thermal problems in High Temperature Gas Reactors	prof. dr hab. inż. Piotr Furmański	I
11.	Numerical modelling of application of chemical reactions in thermal energy storage	prof. dr hab. inż. Piotr Furmański	I
12.	Evaluation of the degree of moisture in materials using infrared thermography.	prof. dr hab. inż. Piotr Furmański	E/M
13.	Thermodynamic optimization of the position of screens in multi-layer high-temperature insulations.	prof. dr hab. inż. Piotr Furmański	E/M
14.	Thermodynamic optimization of micro-heat exchangers.	prof. dr hab. inż. Piotr Furmański	E/M
15.	Numerical modeling of heat exchange during the water storage process in metal tanks for agriculture	prof. dr hab. inż. Piotr Furmański	E/M
16.	The use of neural networks to determine the thermal properties of substances as a function of various parameters.	prof. dr hab. inż. Piotr Furmański	E/M
17.	Parallel calculations (parallelization of algorithms) in radiative heat exchange.	prof. dr hab. inż. Piotr Furmański	E/M
18.	Analysis of the thermal efficiency of MLI (multi-layer insulation) as a function of its various spatial shapes.	prof. dr hab. inż. Piotr Furmański	E/M
19.	Numerical analysis of the application of diffusion approximation in problems of radiation in optically active media	prof. dr hab. inż. Piotr Furmański	E/M
20.	Numerical modeling of the material drying process.	prof. dr hab. inż. Piotr Furmański	E/M
21.	Numerical modeling of heat exchange and ventilation in urban complexes.	prof. dr hab. inż. Piotr Furmański	E/M
22.	Methodology, preparation and implementation of thermal tests correlating the mathematical model of the satellite with environmental tests	prof. dr hab. inż. Piotr Furmański	E/M
23.	Modeling of the heat transfer process in geothermal probes.	prof. dr hab. inż. Piotr Furmański	E/M
24.	Flow optimization in the module for the pressure retarded osmosis process (simulations in ANSYS Fluent, development of 3D model).	dr hab. inż. Piotr Łapka, prof. PW	E/M
25.	Concept development and analysis of a closed cycle based on the pressure retarded osmosis process for energy generation (development of 0D/1D model).	dr hab. inż. Piotr Łapka, prof. PW	E/M
26.	Analysis of alternative working media for the pressure retarded osmosis process.	dr hab. inż. Piotr Łapka, prof. PW	I
27.	Development of a model of mass and heat transfer through the membrane in the pressure retarded osmosis process (development of 1D model).	dr hab. inż. Piotr Łapka, prof. PW	E/M
28.	Development of the model and analysis of the ORC (development of 0D/1D model).	dr hab. inż. Piotr Łapka, prof. PW	I/E
29.	Development of model and analysis of thermochemical energy storage system (development of 1D model)	dr hab. inż. Piotr Łapka, prof. PW	E/M
30.	Optimization/parametric analysis of operation of thermal energy storage system with phase change materials (simulations in ANSYS Fluent, required modifications of existing model and simulation)	dr hab. inż. Piotr Łapka, prof. PW	I/E/M
31.	Analysis of the influence of various factors on moisture and heat transfer in clothing (required modifications of existing model and simulation)	dr hab. inż. Piotr Łapka, prof. PW	I/E
32.	Optimization of the structure of the protective clothing in terms of heat and moisture transport (required modifications of existing model and simulation)	dr hab. inż. Piotr Łapka, prof. PW	I/E
33.	Development of model and analysis of the operation of a ground heat exchanger/heat exchanger in diaphragm walls (model 1D/ANSYS Fluent)	dr hab. inż. Piotr Łapka, prof. PW	E/M
34.	Development of a heat transfer model in bio-based building materials, e.g., in hemp concrete (developed of 1D model)	dr hab. inż. Piotr Łapka, prof. PW	E/M
35.	Optimization of the drying process of building materials (modeling in ANSYS Fluent, required modifications of existing model and simulation)	dr hab. inż. Piotr Łapka, prof. PW	E/M
36.	Modeling of heat transfer in PEX pipes with modifications of internal surfaces (modeling in ANSYS Fluent, optimization of surface structure)	dr hab. inż. Piotr Łapka, prof. PW	I/E/M
37.	Parametric analysis of the operation of the high-temperature air-exhaust gases heat exchanger (required modifications of existing model and simulation)	dr hab. inż. Piotr Łapka, prof. PW	I/E
38.	Photoelectrochemical Conversion of Carbon Dioxide (CO_2) into Fuels and Value-Added Products	dr hab. inż. Mirosław Seredyński, prof. PW	I
39.	Model of the phase change in salt hydrates with supercooling.	dr hab. inż. Mirosław Seredyński, prof. PW	M
40.	Thermochemical energy storage	dr hab. inż. Mirosław Seredyński, prof. PW	I
41.	Hybrid 3 in 1 thermal energy storage systems	dr hab. inż. Mirosław Seredyński, prof. PW	I
42.	Methods of intensification of heat transfer in thermal storage systems.	dr hab. inż. Mirosław Seredyński, prof. PW	I
43.	Development of the numerical model of equiaxed grain growth in undercooled bulk liquid under diffusive heat transfer conditions (Fluent).	dr hab. inż. Mirosław Seredyński, prof. PW	M
44.	Development of the numerical model of equiaxed grain growth in undercooled bulk liquid under diffusive heat transfer conditions (development of an in-house numerical code).	dr hab. inż. Mirosław Seredyński, prof. PW	M
45.	Determination of the effective heat transfer coefficient on a surface of the probe in the Bridgmann furnace.	dr hab. inż. Mirosław Seredyński, prof. PW	E/M
46.	Numerical model of additive manufacturing process.	dr hab. inż. Mirosław Seredyński, prof. PW	I
47.	Mesocale model of binary alloy solidification (Fluent)	dr hab. inż. Mirosław Seredyński, prof. PW	I
48.	Implementation of the level-set model. (Fluent)	dr hab. inż. Mirosław Seredyński, prof. PW	I
49.	Numerical modelling of heat and mass transfer accompanying phase change in porous materials. (Fluent)	dr hab. inż. Mirosław Seredyński, prof. PW	E/M
50.	Numerical modeling of ablation (Fluent)	dr hab. inż. Mirosław Seredyński, prof. PW	M
51.	Simplified numerical model of heat transfer in evaporator/condenser (in-house numerical model)	dr hab. inż. Mirosław Seredyński, prof. PW	E/M
52.	Modelling of intensitication of heat transfer with metal foams (fluent)	dr hab. inż. Mirosław Seredyński, prof. PW	I/M
53.	Modelling of effective thermal conductivity of metal foam - PCM composite	dr hab. inż. Mirosław Seredyński, prof. PW	I/E/M
54.	Numerical determination of effective thermal conductivity of a metal foam (Fluent)	dr hab. inż. Mirosław Seredyński, prof. PW	M
55.	Thermal dispersion models in metal foams	dr hab. inż. Mirosław Seredyński, prof. PW	I/E
56.	Thermal calculations for electic motor cooling (fluent)	dr hab. inż. Mirosław Seredyński, prof. PW	E
57.	Simulation of evaporation in microchannel (Fluent)	dr hab. inż. Mirosław Seredyński, prof. PW	M
58.	Solar heating of the swimming pool	dr inż. Karolina Błogowska	I
59.	Energy analysis of an independent collector system in a building	dr inż. Karolina Błogowska	I
60.	Project of solar power supply for a sailing yacht's electrical installation	dr inż. Karolina Błogowska	E/M
61.	Preliminary energy supply design for an energy independent building	dr inż. Karolina Błogowska	E/M
62.	Energy analysis of the operation of a PV installation connected to the power grid	dr inż. Karolina Błogowska	E/M
63.	Preliminary design of photovoltaic lighting for the selected road node	dr inż. Karolina Błogowska	I

64.	Determination of sorption isotherm of a building material with an inverse method (programming language of choice)	dr inż. Karol Pietrak	M/E
65.	Programming and testing of an analytical effective thermal conductivity model for two-phase composite with interfacial thermal resistance (MATLAB)	dr inż. Karol Pietrak	I/E
66.	Programming of an analytical effective thermal conductivity model for two-phase composite with interfacial thermal resistance and its comparison with existing models (MATLAB)	dr inż. Karol Pietrak	M
67.	Methods of data science as support in numerical analyses of thermal and fluid mechanics problems	dr inż. Karol Pietrak	I/M
68.	Measurements of hygric properties of building materials (sorption isotherm, water vapor permeability)	dr inż. Karol Pietrak	E
69.	Analysis of capacity of renewable sources which may be integrated with a selected power system	mgr inż. Adam Rajewski	I
70.	Comparison of support mechanisms for renewable energy sources in selected countries	mgr inż. Adam Rajewski	I
71.	Analysis of systems for financing nuclear power projects in selected countries	mgr inż. Adam Rajewski	I
72.	Study of feasibility of using nuclear energy in selected business (transportation, heating, industrial power generation, spacecraft etc.)	mgr inż. Adam Rajewski	I
73.	Evaluation of perspectives for selected advanced nuclear technologies	mgr inż. Adam Rajewski	I
74.	Analysis of demand for energy storage capacity, which would enable selected power system to go 100% renewable	mgr inż. Adam Rajewski	I
75.	Evaluation of complete carbon footprint of selected energy source/mode of transportation in a selected country	mgr inż. Adam Rajewski	I
76.	Comaprative analysis of safety systems in selected nuclear technologies	mgr inż. Adam Rajewski	I
77.	EROI analysis for selected energy source	mgr inż. Adam Rajewski	I
78.	Review of heat and moisture transfer modesl in soil	mgr inż. Michał Wasik	I
79.	Heat and moisture transfer modeling in soil	mgr inż. Michał Wasik	I
80.	Modeling of the phase change kinetics in a non-equilibrium heat and moisture transfer model in porous materials	mgr inż. Michał Wasik	I
81.	Parametric analysis of the damp wall drying process	mgr inż. Michał Wasik	I
82.	Measurement of the properties of building materials with biocomponents (density, specific heat, thermal conductivity)	mgr inż. Michał Wasik	I
83.	Study of the heat and moisture exchange process in building materials with biocomponents	mgr inż. Michał Wasik	I
84.	Conceptual and economic feasibility study of installing renewable energy sources in a single-family house.	mgr inż. Łukasz Cieślikiewicz	I
85.	Conceptual and economic feasibility study of installing renewable energy sources in a multi-family house.	mgr inż. Łukasz Cieślikiewicz	I
86.	Conceptual and economic feasibility study of installing renewable energy sources in a residential estate.	mgr inż. Łukasz Cieślikiewicz	I
87.	Construction of a stand for simulating daily temperature changes (water thermostat)	mgr inż. Łukasz Cieślikiewicz	I
88.	Investigation of thermo-humidity processes of porous materials	mgr inż. Łukasz Cieślikiewicz	I
89.	Studies of thermodynamic processes and heat exchange phenomena (development of the concept and execution of the station)	mgr inż. Łukasz Cieślikiewicz	I
90.	Studies of osmotic processes	mgr inż. Łukasz Cieślikiewicz	I
91.	Review of manufacturing methods and theral, and physical properties of bio-composites materials ("hempcrete" type)	dr inż. Michał Kubiś	I
92.	Testing the physical and thermal properties of bio-comnposites ("hempcrete" type)	dr inż. Michał Kubiś	I
93.	Study of the influence of manufacturing process parameters on the thermal properties of carbon fibre reinforced polymer composites	dr inż. Michał Kubiś	E/M
94.	Review of composite wind turbine blades manufacturing methods	dr inż. Michał Kubiś	I
95.	Prediction of effective thermal conductivity on the basis of microstructure images of polymer composites obtained with scanning electron microscope	dr inż. Michał Kubiś	I/E
96.	Manufacturing and testing of thermal properties of carbon fibre-reinforced polymer composites	dr inż. Michał Kubiś	I/E
97.	Solar heat pumps in large-scale applications (possibility to perform calculations in the TRNSYS environment)	dr inż. Marcin Bugaj	P/PO/I/M
98.	PVT collectors in installations with multi-source heat pumps (the possibility of making calculations in the TRNSYS environment)	dr inż. Marcin Bugaj	P/PO/I/M