ADVANCED FLOW AND HEAT TRANSFER INVESTIGATION GROUP

Contact details

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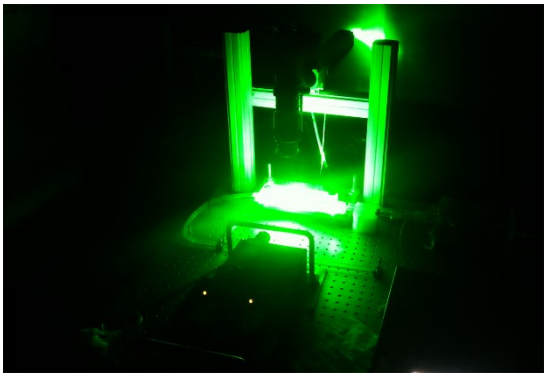

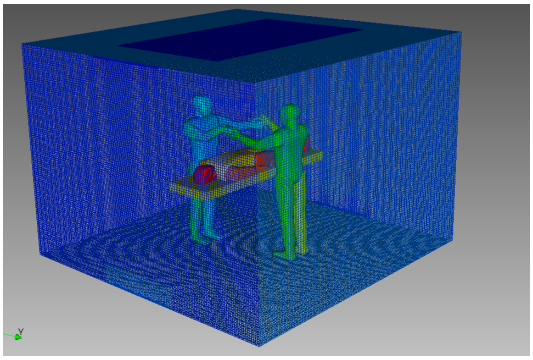

Areas of expertise

Ventilation / Personalized ventilation -Thermal comfort, Pollution Reduction, Indoor Air Quality (AIQ) – CFD studies
Smoke and Hot Gases Evacuation in Fires - CFD studies
Biomedical Engineering - Flows through Bypass Grafts and Mechanical Heart Valves - numerical (CFD) and experimental investigations (PIV)
Heat and Mass Transfer -Free and Impinging Jets with application in Heating Ventilation and Air Conditioning; Heat Transfer; Combustion: reactive and non-reactive flows – numerical (CFD), experimental investigations
Fluid Flow Control Systems - Design and manufacture of controllers for fluid systems; Sensorics; Analyse and signal processing.

Team

Assoc. Prof. Dr. Eng. Florin Bode, Prof. Dr. Eng. Victor Hodor, Assoc. Prof. Dr. Eng. Corina Giurgea, Assoc. Prof. Dr. Eng. Lucian Nascutiu, Assist. Dr. Eng. Daniel Banyai, Dr. Med. Octavian Ioan Budiu, Drd. Ing. Titus Joldos

Representative projects

SAFE - Innovative seating system to reduce SARS-CoV-2 transmission on board of commercial aircrafts, PN-III-P2-2.1-PED-2021-2265, Responsible**:** Florin Bode, http://www.cambi.ro/safe (2022-2024)
XTREME Innovative system to extend the range of electric vehicles at improved thermal comfort PN-III-P2-2.1-PED-2019-4249**,** Responsible**:** Florin Bode, www.cambi.ro/xtreme (2020-2022)
INSIDE, "**Innovative strategies of HVAC systems for high indoor environmental quality in vehicles",** PN-II-PT-PCCA, Responsible**:** Florin Bode,http://cambi.ro/inside/ (2014-2017)
EQUATOR, **"Advanced strategies for high performance indoor Environmental QUAliTy in Operating Rooms"**, PN-II-PT-PCCA, Responsible**:** Victor Hodor, http://cambi.ro/equator/index.html (2012-2016)
MAACH, **"Advanced Methods of Analysis and Control in Hemodynamics, with applications in peripheral vascular surgery",** Responsible**:** Corina Giurgea, CNMP PN-II- (Complex Partnership Project), http://www.cnmp.ro:8083/pncdi2/program4/documente/2010/sedinta/rez/D8/82-086.pdf (2008-2011)

Significant results

The most representative publications of the past 5 years:

1. **CORINA MARIA GIURGEA**, Carmen-Anca Safta, Ciprian Lupu, Mihaela Ordean[4] and Dan Opruţa, 2023 IOP Conf. Ser.: Earth Environ. https://iopscience.iop.org/article/10.1088/1755-1315/1136/1/012010
2. Andrei – Stelian BEJAN, **Florin BODE***, et al, Journal of Cleaner Production, Volume 336, 15 February 2022, 130398, https://doi.org/10.1016/j.jclepro.2022.130398, ***IF2021:11.072 (Q1)***, 2022
3. El Bachir LAHMER*, **Florin BODE**, et al, Thermal Science and Engineering Progress, https://doi.org/10.1016/j.tsep.2023.101804, 2451-9049, 2023 Elsevier, ***IF2021: 4.8 (IF: Q1, AIS: Q1)***.

4. Matei Razvan GEORGESCU*, **Florin BODE**, et al, Building and Environment, Volume 204, 15 October 2021, 108150, ISSN 0360-1323, eISSN 1873-684X, https://doi.org/10.1016/j.buildenv.2021.108150, ***IF2021:7.093 (Q1)***
5. **Florin BODE***, **Daniel BANYAI**, et al, Enhancing Fire Safety, Fire Journal, 6(12), 451; https://doi.org/10.3390/fire6120451, 2023, ***(IF2022:3.2, IF:Q1, AIS:Q1)**, 2023*
6. Ionut VOICU, Rania RIZK, Hasna LOUAHLIA, **Florin BODE**, Hamid GUALOUS**,** Applied Thermal Engineering, https://doi.org/10.1016/j.applthermaleng.2019.113903, **IF.4.026**,**Q1,** vol. 159, August 2019
7. **Florin BODE**, Ilinca NASTASE*, ISSN: 1660-4601; Int. J. Environ. Res. Public Health 2023, 20(1), 740; https://doi.org/10.3390/ijerph20010740 , Q1 ***(IF2021:4.64, IF:Q1)***
8. **Florin BODE**, et al, Sustainability, 15, no. 6: 5534. https://doi.org/10.3390/su15065534, 2023, IF2022: 3.9, Q2
9. Ilinca NASTASE, **Florin BODE***, et al, Energy Reports, Volume 8, November 2022, Pages 10501-10517, https://doi.org/10.1016/j.egyr.2022.08.186, ISSN 2352-4847, IF:2021:4.937 **(Q2)**, 2022
10. **Florin BODE**, et al, Thermal Science, 2021 Volume 25, Issue 4 Part A, Pages: 2637-2652, https://doi.org/10.2298/TSCI200713227B, ISSN 0354-9836, eISSN 2334-7163, IF2021:1.971 **(Q3)**, 2021

Significant solutions:

High accuracy mapping of the flow fields by using PIV and CFD investigations with possible future applications for: the graft geometry optimization (flow through a femoral artery bypass) respectively the nozzle design optimization (in Personalized Ventilation). **Water Management at Music Festivals:** Developing strategies for efficient water use and wastewater management to mitigate the environmental footprint of large-scale events. **Enhanced Heating and Cooling Systems:** Utilization of phase-changing materials within solar collectors and cooling systems for microprocessors demonstrates a forward-thinking approach to thermal management, ensuring devices operate within optimal temperature ranges while minimizing energy consumption. **Ventilation Solutions for Confined Spaces**: Tailored ventilation strategies for the International Space Station and aircraft cabins focus on improving air quality and comfort through the reduction of CO2 levels and personalized airflow, showcasing an innovative approach to environmental control in specialized habitats. **Fire Safety in Building Materials:** Advanced research into the fire resistance of external thermal insulation composite systems enhances the safety of building exteriors, offering critical insights into materials science for construction.

Products and technologies:

Technology for manufacturing optically transparent models suited to PIV investigations. The models consist of idealized bifurcations or axisymmetric channels machined in blocks of Plexiglass with a high degree of transparency and refractive index that could be matched with that of certain working fluids (Technology developed in cooperation with colleagues from the Department of Machine Building of the UTCN). ***An experimental setup*** integrating a flow circuit reproducing the flow through a femoral artery bypass and a 2D PIV system that would allow the investigation by the PIV method of pulsating flows similar to those in a segment of the human circulatory system. ***Seat Heating System for Electric Vehicles:*** An innovative approach to vehicle interior design, this technology enhances passenger comfort while optimizing energy use, contributing to the overall range and efficiency of electric vehicles. ***Personalized Ventilation Systems***: Designed for use in confined spaces, these systems offer customizable air quality improvements, significantly enhancing occupant comfort and safety in environments where air circulation is limited.

Others: Creation of a laboratory that provides appropriate conditions (darkroom, flat surfaces, optical table and devices, 2D PIV system, experimental setups) for flow investigations through optical methods

The offer addressed to the economic environment

Research & development	Providing support (expertise and facilities) for research in connected fields like: hemodynamics, biomedical flows, thermo-gas-dynamics/combustion by the complementary use of CFD techniques and optical PIV methods. Developing/upgrading the experimental setup used to investigate the pulsed flows similar to that through a bypass (currently in the experimental model stage) with a view toward potential use in testing vascular prostheses Designing and machining customized optically transparent models of axisymmetric channels and bifurcations appropriate for PIV investigations Developing solutions for PV (Personalized Ventilation) and HVAC (Heating Ventilation and Air Conditioning) based on CFD numerical simulations Measuring viscosities for a wide range of fluids, including non-Newtonian fluids, and low viscosity fluids (e.g. possible beneficiaries in cosmetics or pharma industries) Measuring parameters for monitoring the indoor air quality (temperature, humidity, air velocity, CO2 concentrations) CFD studies for Fires, Smoke and Hot Gases Evacuation in Fires Ventilation and Thermal Comfort in various spaces
Consulting	Consulting and technical support for designing, building and evaluation of thermo-energy and combustion equipment. Technical and judicial expertise in the area of: using thermal equipment and combustion Smoke and Hot Gases Evacuation in Fires Ventilation and Thermal Comfort in various spaces
Training	Courses for providing surgeons with a new approach to reconstructive bypass surgery from the engineering perspective. Introductory course in numerical simulation of fluid flow and heat transfer for undergraduate students and students at the MSc, doctoral and postdoc level (2018-2021: 12 Undergraduate St. + 3MSc.St. + 2 PhD St +1 postdoc.) Initial training in in PIV optical measurement techniques for students at the M.Sc. and doctoral level.

Last updated: January 2024