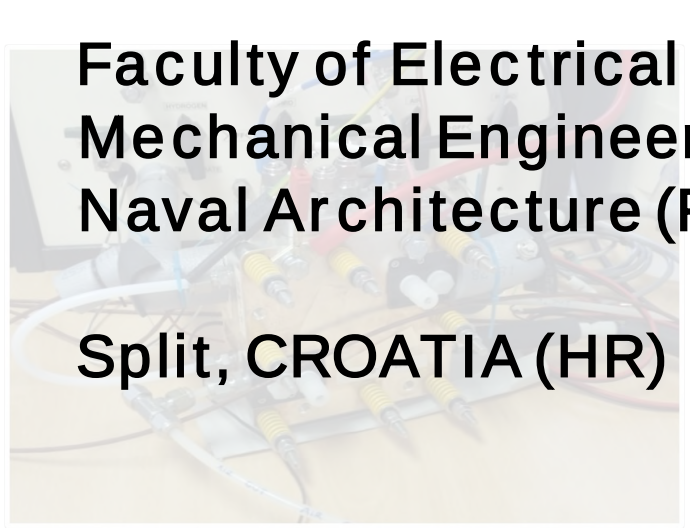
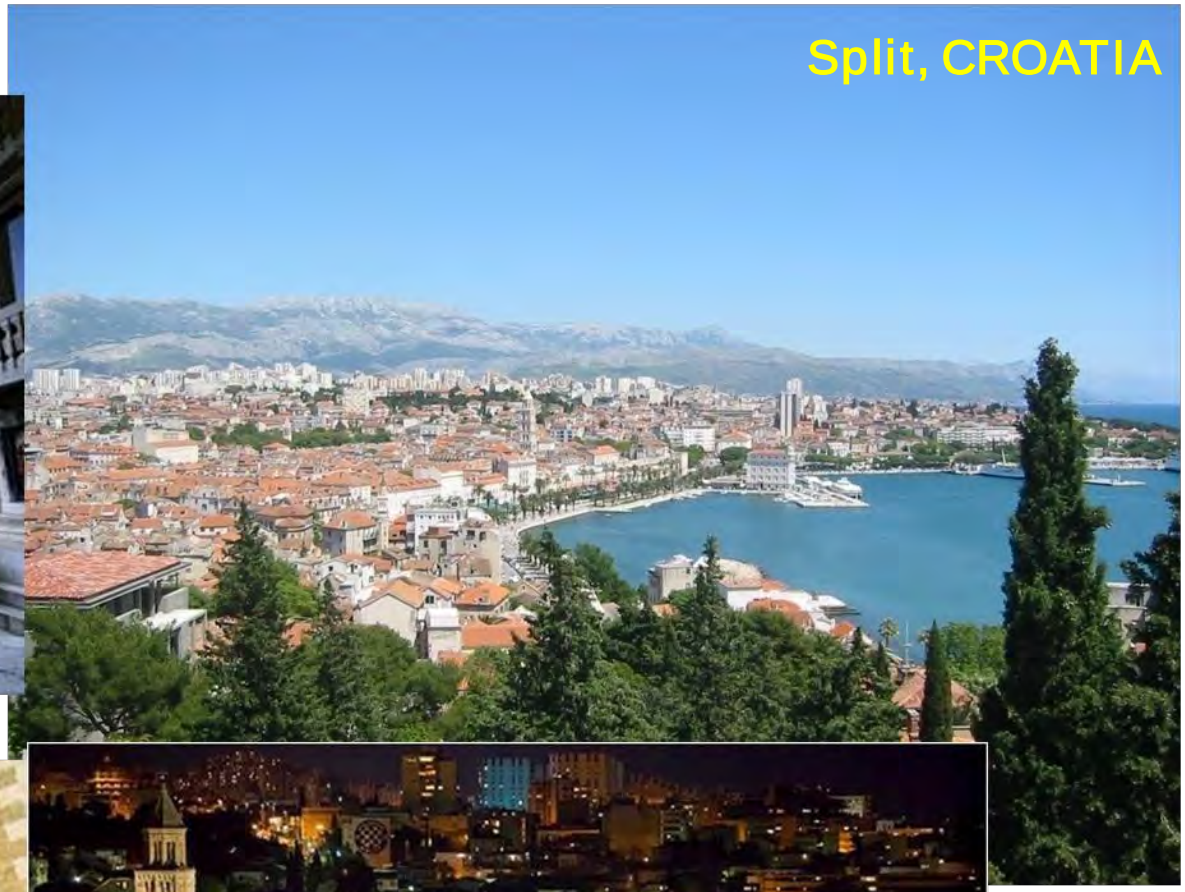
Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture (FESB)

Split, CROATIA (HR)




CROATIA

Split, CROATIA



Study Programs

Electrotechnics and Information Technologies

Computer Science

Mechanical Engineering

Naval Architecture

Industrial Engineering

	Bachelor			Master		Ph.D.		
Electrotechnics and Information Technologies	1	2	3	1	2	1	2	3
Computer Science	1	2	3	1	2	1	2	3
Mechanical Engineering	1	2	3	1	2	1	2	3
Naval Architecture	1	2	3	1	2			
Industrial Engineering	1	2	3	1	2			

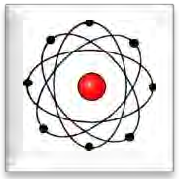
Organization/Departments

Power Engineering

Electronics

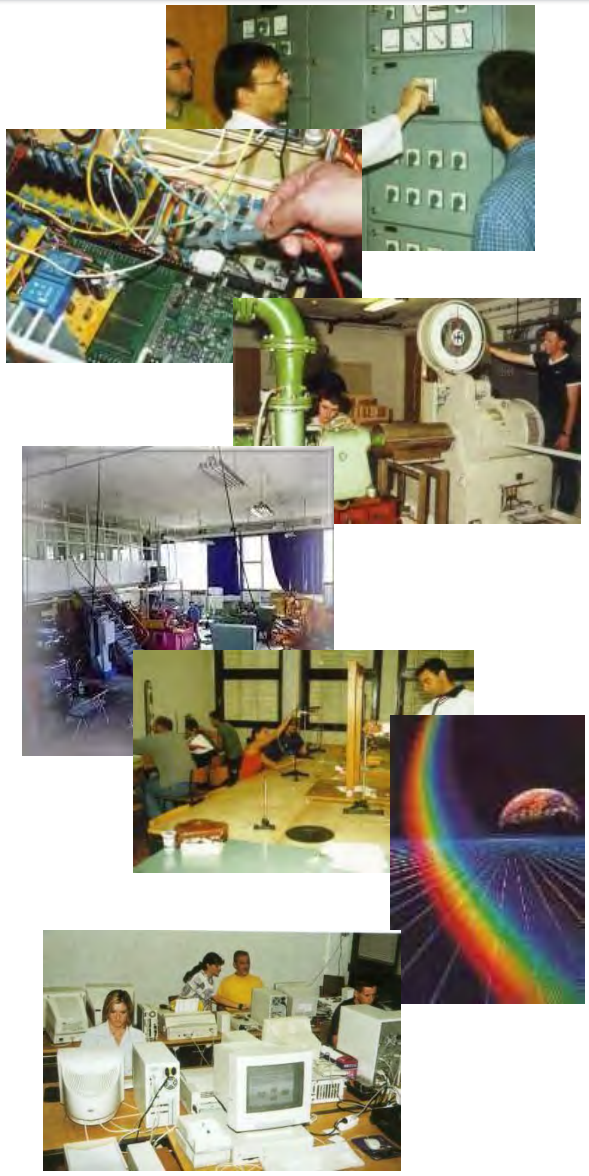
Mechanical Engineering and Naval Architecture

Mechanical Technology and Materials



Mathematics and Physics

Common Courses



FESB in numbers

Teaching staff/researchers	
Full professors	35
Associate professors	20
Docents	34
Lecturers	7
Assistants/postdocs	28
Assistant/PhD students	31
	155

Students	
Current students	2600
Enrollment	600
Alumni	9000
PhD degrees awarded	55

FESB in numbers

Total area (sq.m.)	29 500
Amphitheaters	9
Classrooms	11
Computer labs	10
Laboratories	95

Laboratory for New Energy Technologies

Chair for thermodynamics, thermotechnics and heat engines
Department of mechanical engineering
Faculty of electrical engineering, mechanical engineering and naval architecture

Personnel

dr. sc. Frano Barbir, professor, Chair for Thermodynamics, Head of Laboratory (**seconded within HYDRIDE4MOBILLITY**)
dr. sc. Ivan Tolj, assistant professor, Project supervisor at FESB (**seconded within HYDRIDE4MOBILLITY**)
dr. sc. Zeljko Penga, research assistant
dr.sc. Jagoda Radosevic, prof. emeritus (electrochemistry)
Ivan Pivac, Ph.D. student
Nikolina Pivac, mag.ing.
Domina Cikatic Sanic, Ph.D. student
Boris Simic, ing., lab manager
Ivan Juric, ing. lab technician

External Associates used on different projects on as needed basis

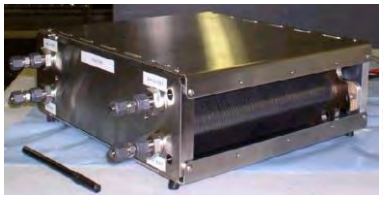
dr. sc. Gojmir Radica, professor, (engine diagnostics)
dr. sc. Gojko Magazinovic, professor (numerical simulations, optimization)
dr. sc. Ante Bilusic, assoc.prof. (physics, heat transfer in nanostructures)
dr. sc. Pasko Zupanovic, professor (physics, thermodynamics)


H2OIE

Laboratory for New Energy Technologies

Activities:

- Testing and characterization of (PEM) fuel cells
- Effect of operational parameters on fuel cell performance
- Thermal effects on cell and stack level
- Flow field configuration
- Flow of reactants through the stack
- Fuel cell applications (motorcycle, boat)

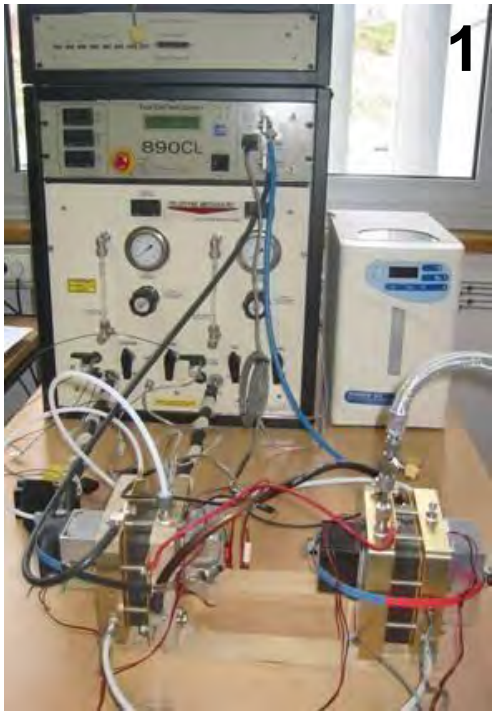


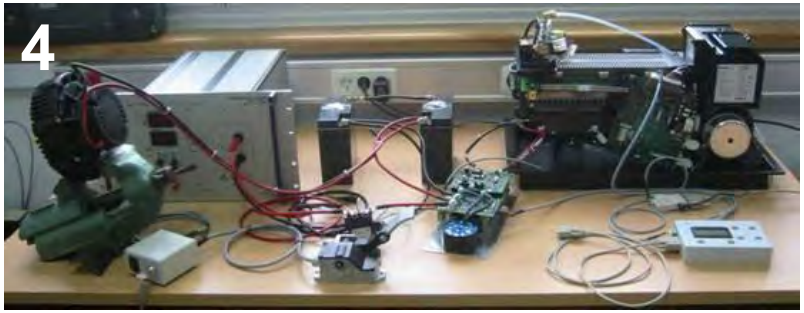
Equipment:

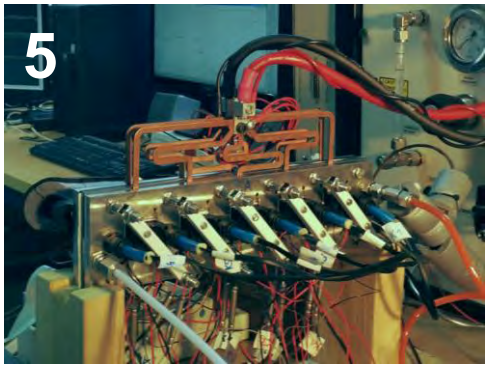
- Fuel cell test station
  - up to 8 cells
  - regulation and measurements of operational parameters
  - Controllable electronic load
  - Built-in EC impedance spectroscopy
- Potentiostat/galvanostat
- Single cell hardware (50cm^2) X3
- Laboratory hydrogen generator (electrolyzer)
- 1 kW complete fuel cell system (Nexa)
  - Electronic load
  - DC/DC converter
  - metal hydride bottles

From the Laboratory

- Circulation of reactants through fuel cells (**1**)
- 1 kW stack operating on hydrogen from metal hydride bottles (**2**)
- Filling of metal hydride bottles (**3**)
- System integration; components testing (**4**)
- Segmented fuel cell (**5**)







Newest Addition to the Lab

Fuel cell stack 1,2 kW

Control unit

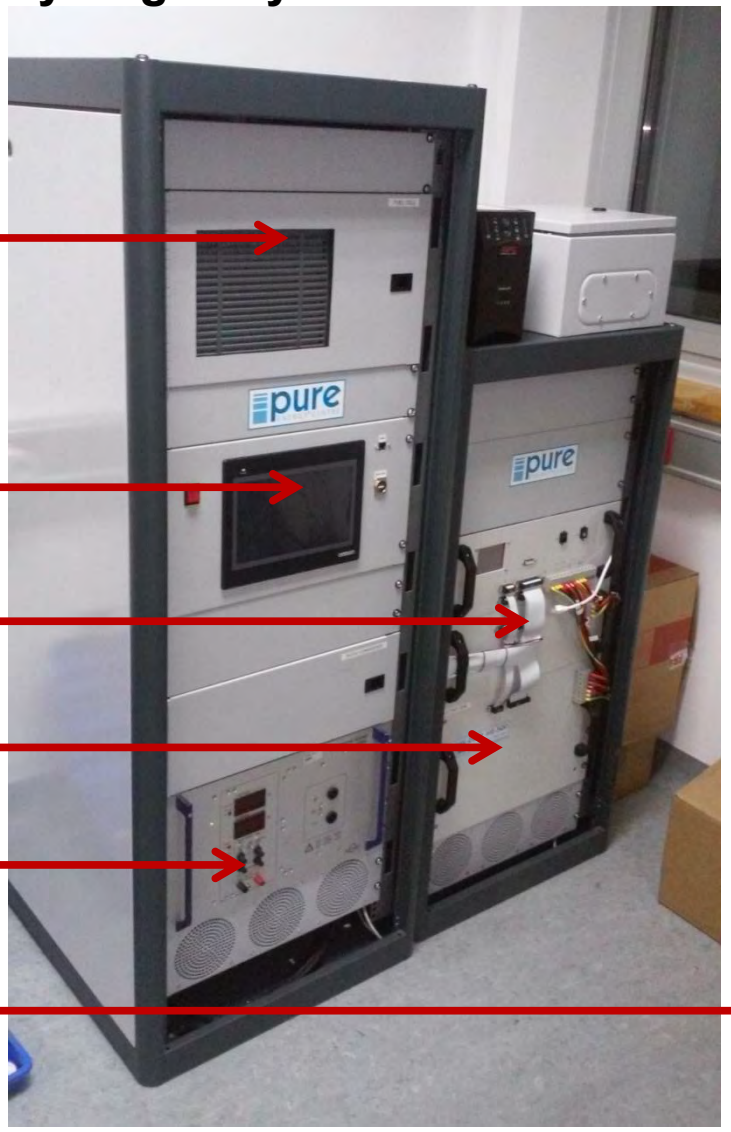
Electrolyzer (3 kW)

DC/DC converter

Electronic load 1,5 kW

Hydrogen storage

Hydrogen system



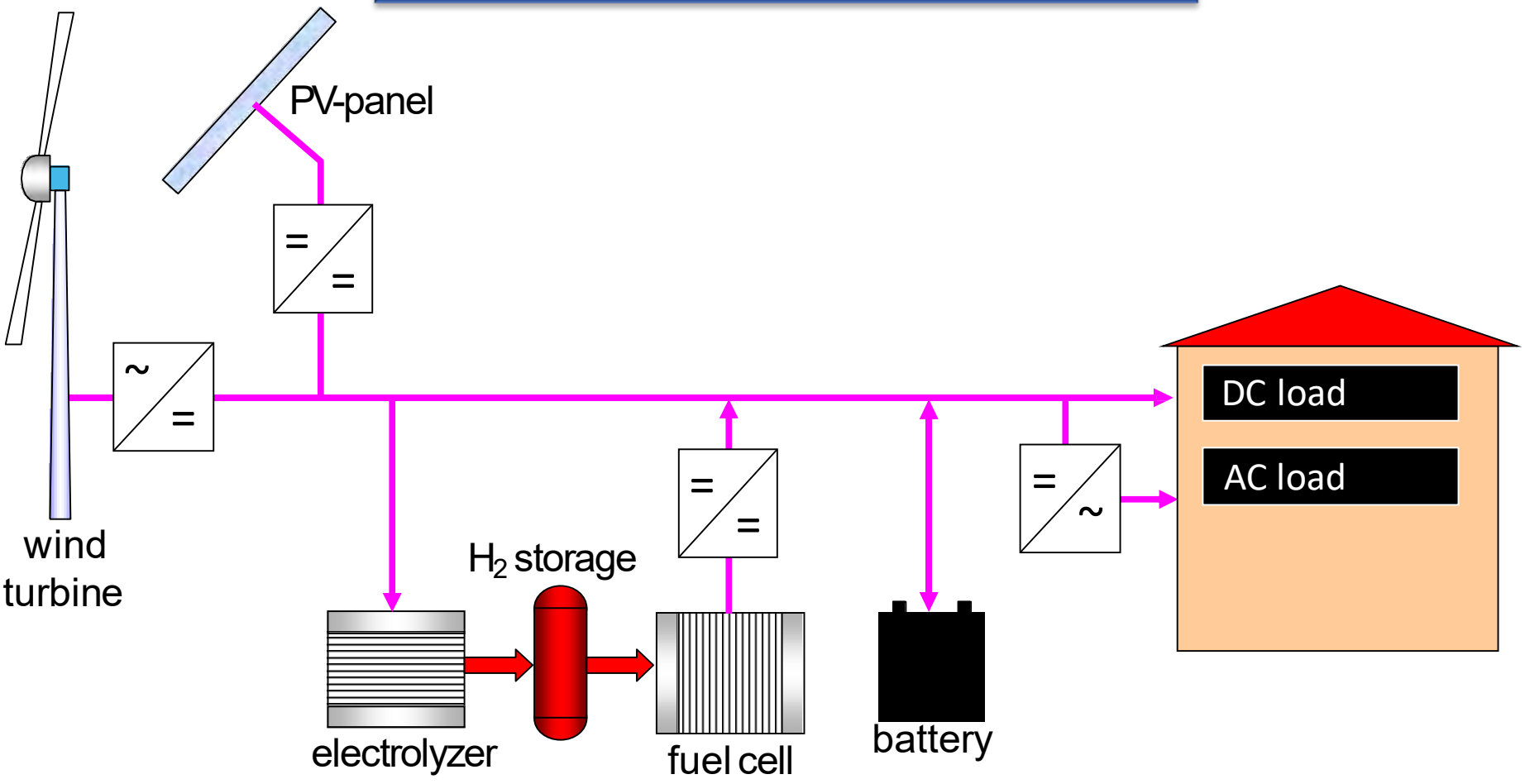
Electrolyzer single cell test station

Connected to the hydrogen energy system in the lab

KONČAR
Electrical Engineering
INSTITUTE

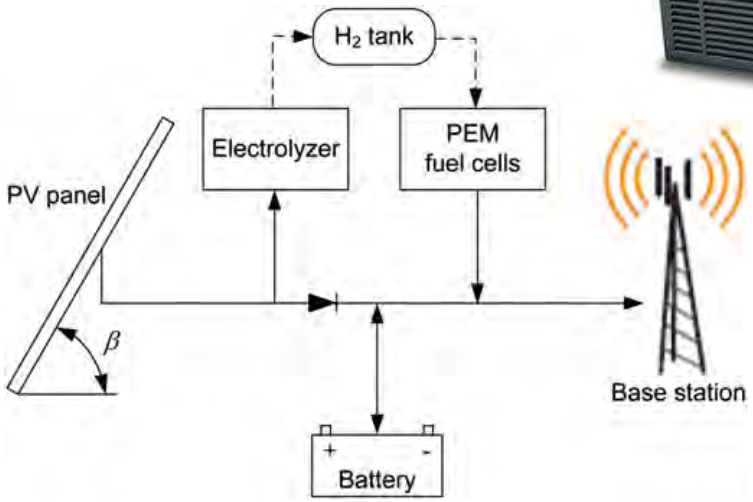
FSB

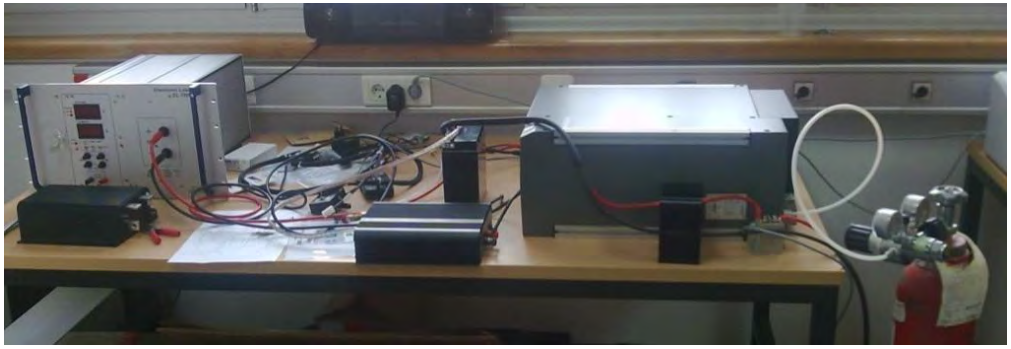
Hybrid Box – Autonomous energy supply for telecommunication base stations



TECHNO-ECONOMIC ANALYSIS OF PEM FUEL CELLS ROLE IN PHOTOVOLTAIC-BASED SYSTEMS FOR THE REMOTE BASE STATIONS

D. Bezmalinovic, F. Barbir, I. Tolj, Int. J. Hydrogen Energy, Vol. 38, No. 1, (2013) pp. 417 – 425





Laboratory for new energy technologies

First fuel cell powered boat in Croatia

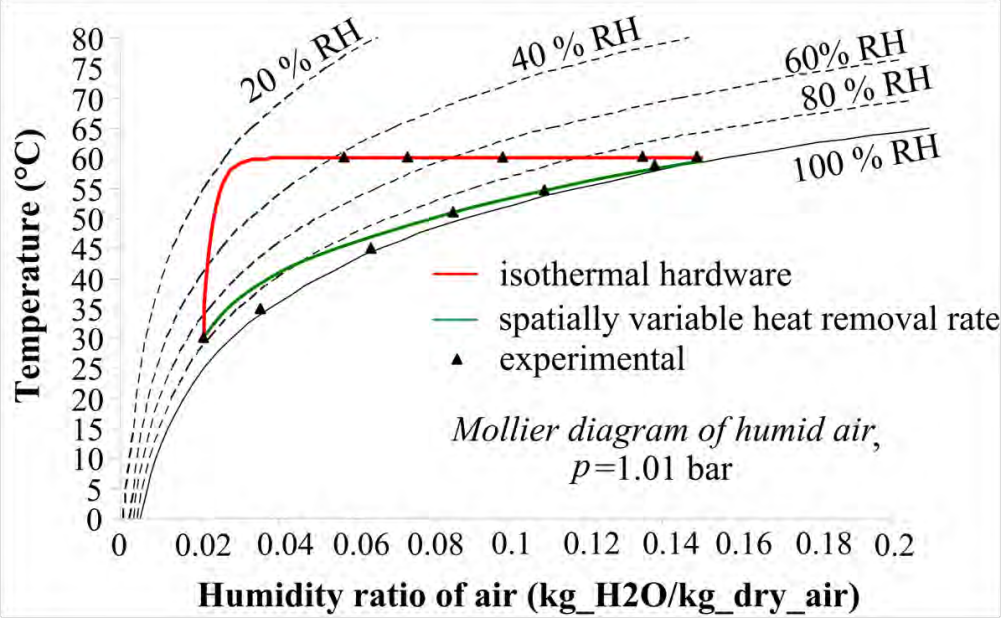
Laboratory for new energy technologies

Fuel cell powered motorcycle - ATV

MAINTAINING DESIRED LEVEL OF RELATIVE HUMIDITY THROUGHOUT A FUEL CELL WITH SPATIALLY VARIABLE HEAT REMOVAL RATES

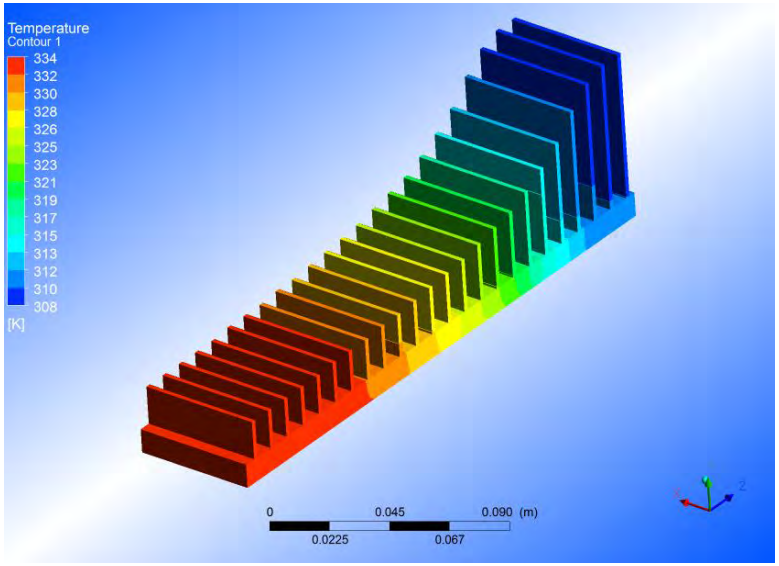
I. Tolj, D. Bezmalinovic, F. Barbir

International Journal of Hydrogen Energy, Vol 36 (2011) pp. 13105 – 13113

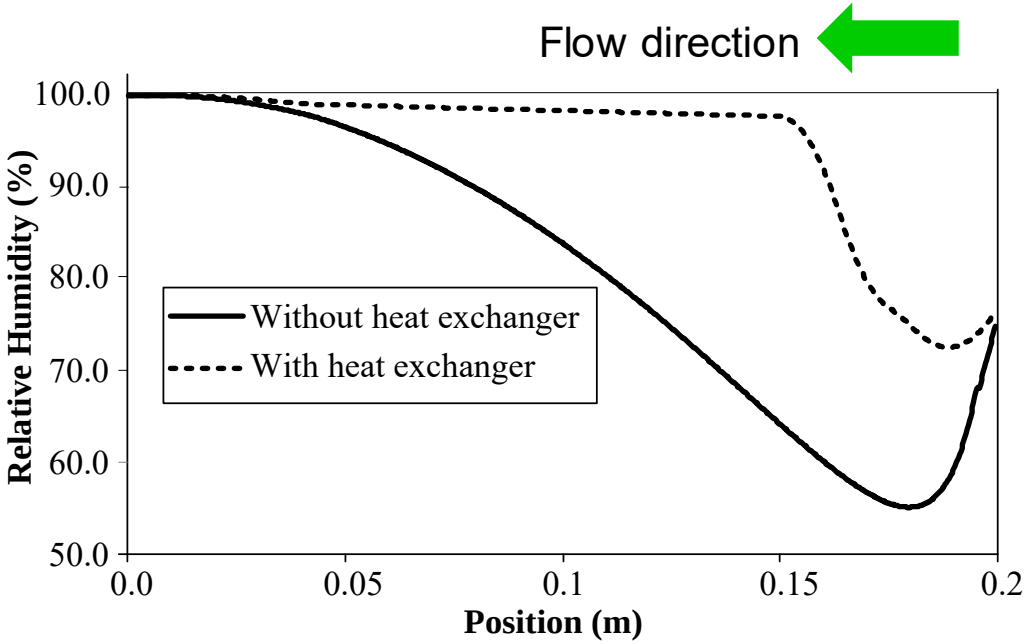


DESIGNING HEAT EXCHANGER WITH VARIABLE SURFACE AREA FOR PASSIVE COOLING OF PEM FUEL CELL

I. Tolj, E. Özden, F. Barbir,
J. Appl. Thermal Eng., Vol. 51, No. 1–2, (2013), pp. 1339-1344



Temperature distribution on the heat exchanger on the fuel cell cathode side



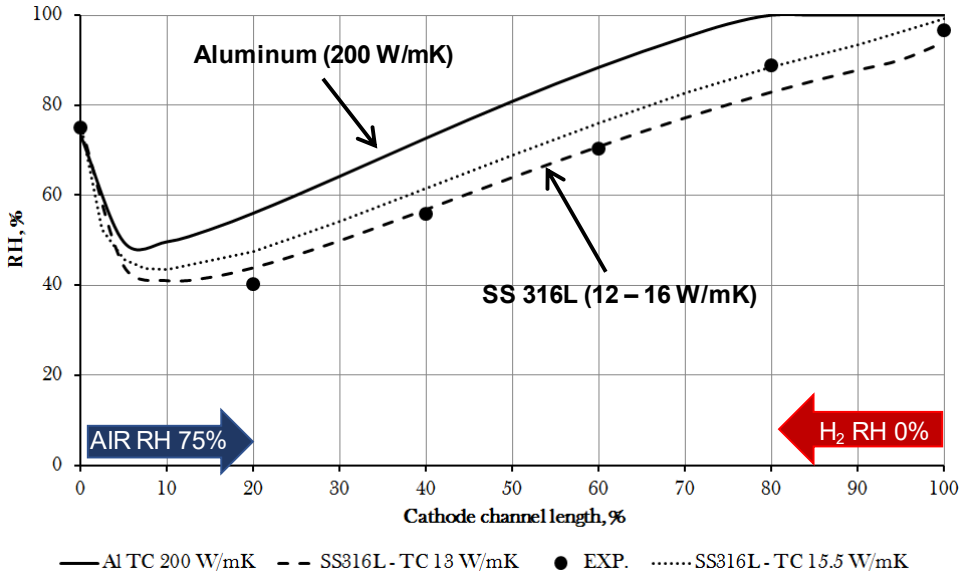
Relative humidity along the cathode channel

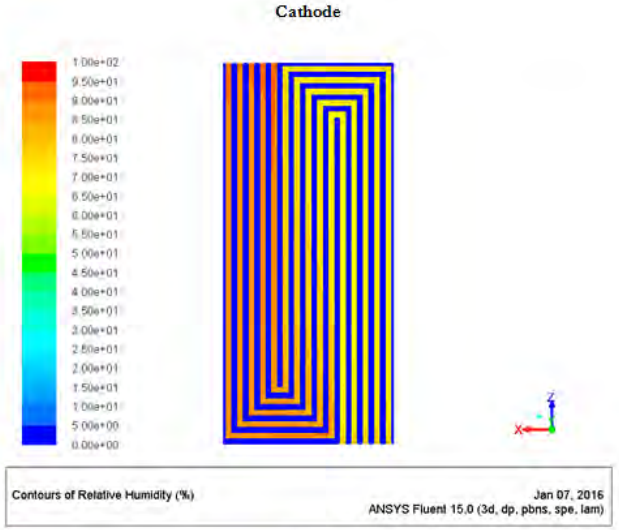
COMPUTATIONAL FLUID DYNAMICS STUDY OF PEM FUEL CELL PERFORMANCE FOR ISOTHERMAL AND NON-UNIFORM TEMPERATURE BOUNDARY CONDITIONS

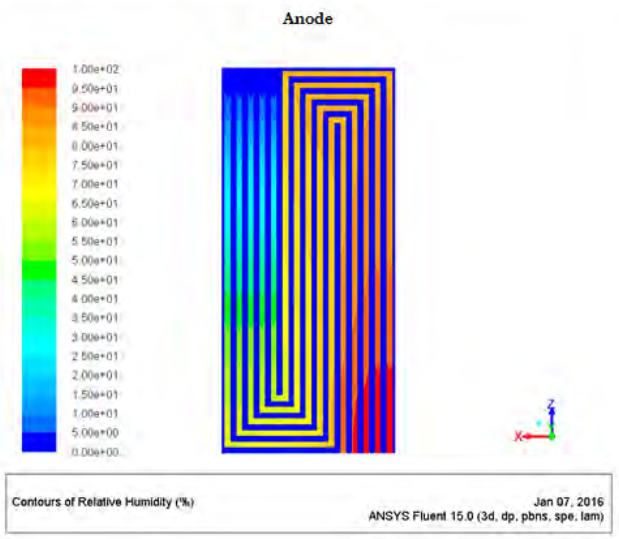
I. Tolj, Z. Penga, F. Barbir

International Journal of Hydrogen Energy, Vol 41 (2016) pp. 17585 – 17594

Influence of current collector material on air relative humidity distribution



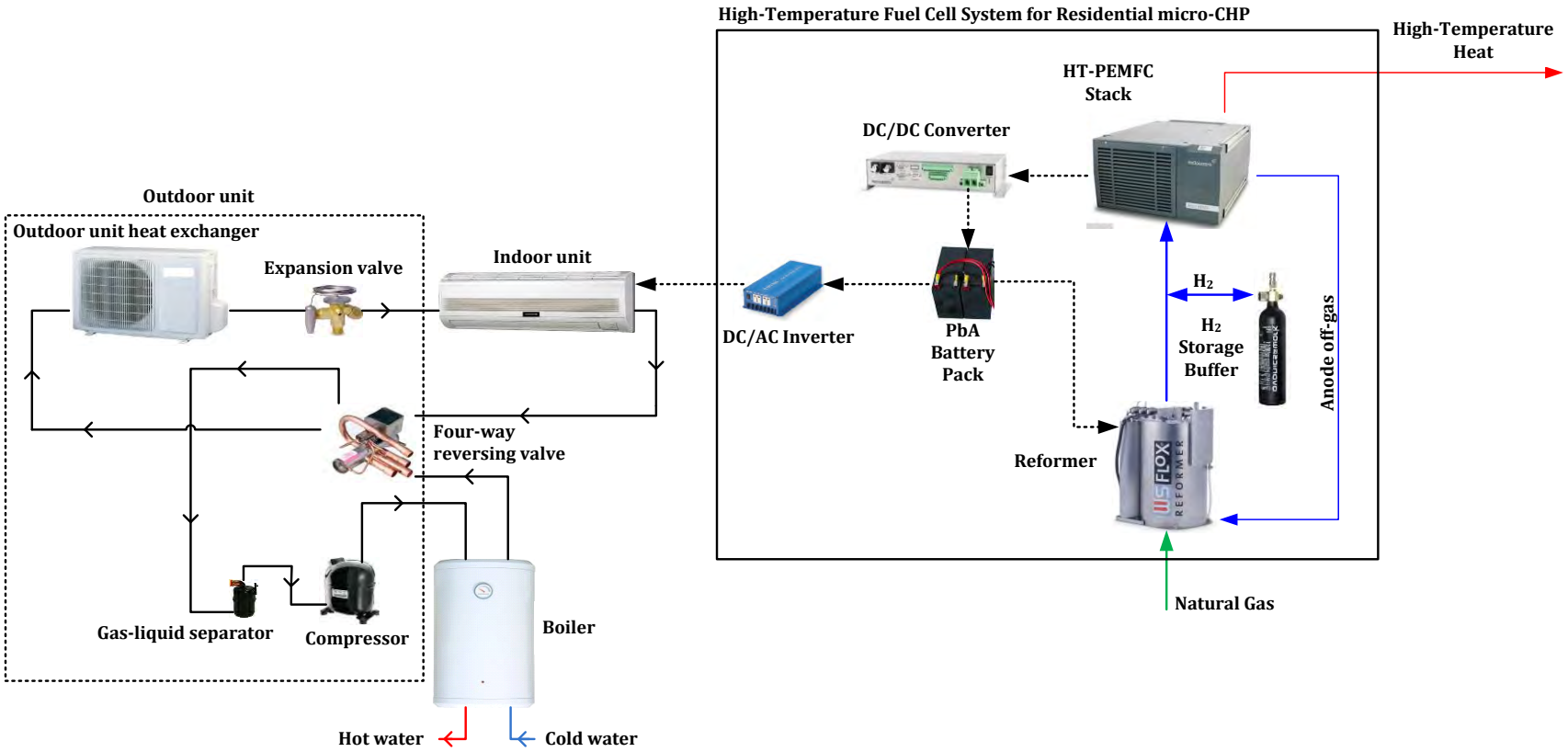




HYBRID ENERGY FUEL CELL BASED SYSTEM FOR HOUSEHOLD APPLICATIONS IN A MEDITERRANEAN CLIMATE

S. Nizetic, I. Tolj, A.M. Papadopoulos

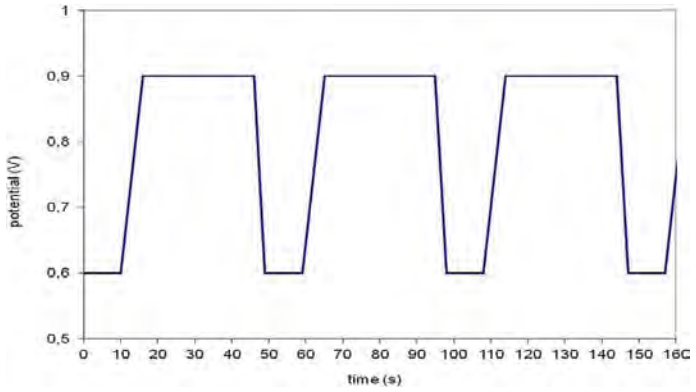
Energy Conversion and Management, Vol 105 (2015) pp. 1037 – 1045

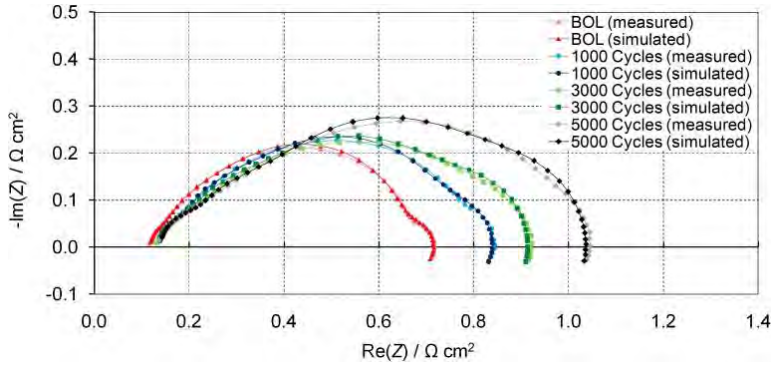


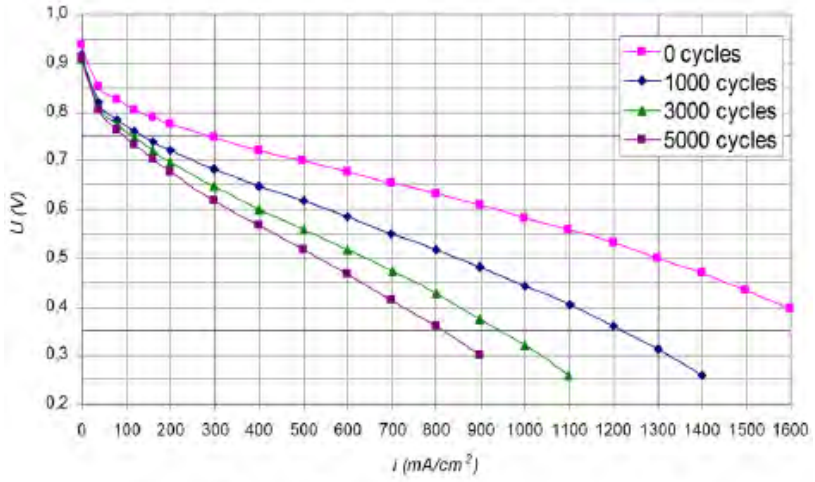
CHARACTERIZATION OF PEM FUEL CELL DEGRADATION BY POLARIZATION CHANGE CURVES

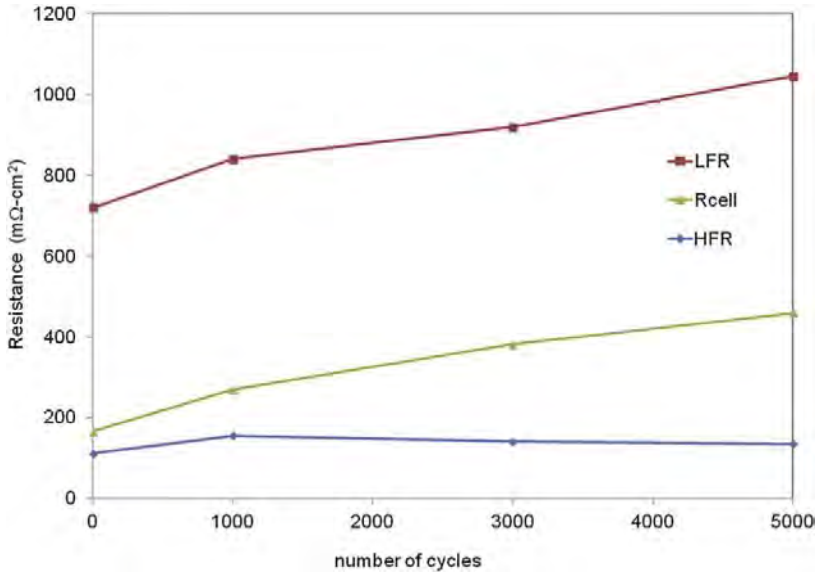
D. Bezmalinović, B. Šimić, F. Barbir,

***Journal of Power Sources*, Vol. 294, (2015) pp. 82-87**









Fuel Cell Activities at FESB

Current Projects

- Water and Heat Management and Durability of PEM Fuel Cells, Croatian Science Foundation, 2014-2018
- Automotive Derivative Energy System (AutoRE) EC FCH Joint Undertaking (Horizon2020), 2015-2018
- Giantleap Improves Automation of Non-polluting Transportation with Lifetime Extension of Automotive PEM fuel cells (Giantleap) EC FCH Joint Undertaking (Horizon2020), 2016-2019
- STIM Center of Excellence for Science and Technology and Integration of the Mediterranean Region, Ministry of Science, Education and Sport, 2015-2020
- Hydrogen fuelled utility vehicles and their support systems utilising metal hydrides (Hydride4Mobility), H2020-MSCA-RISE-2017, 2017-2021

European Commission

Research and Innovation Staff Exchange – RISE

GIANTLEAP

STRUKTURNI I INVESTICIJSKI FONDOVI

STIM

hrzz

Hrvatska zaklada za znanost

SAPPHIRE

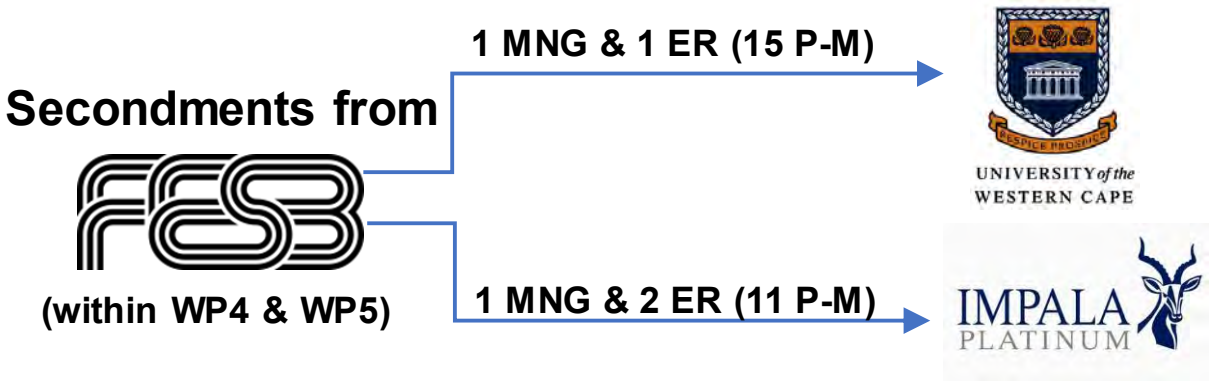
HORIZON 2020

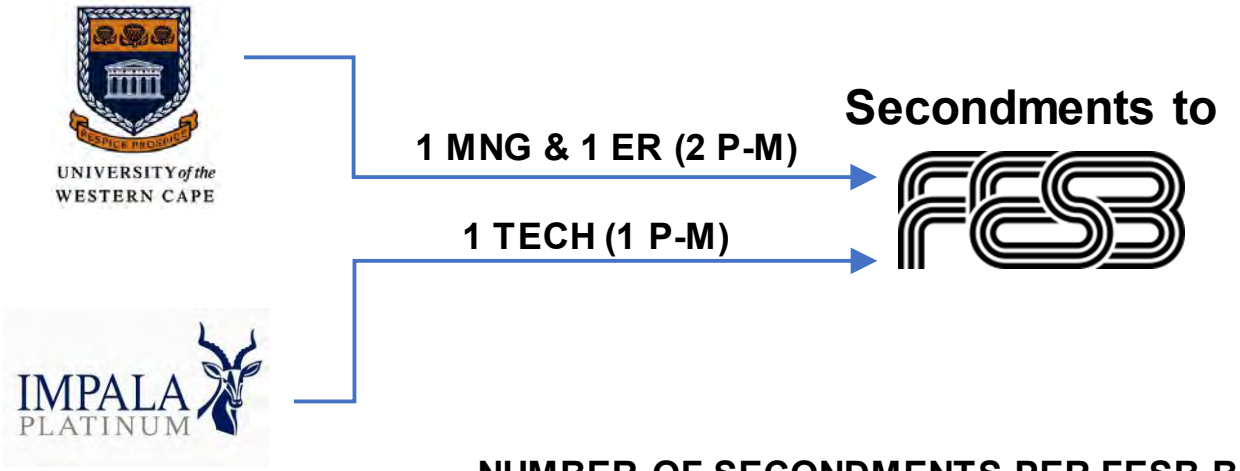
THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

New Energy World JU

fuel cells & hydrogen for sustainability

FESB – Lead beneficiary for **WP4** & **WP5**





NUMBER OF SECONDMENTS PER FESB BENEFICIARY

29

Laboratory for Noise and Vibration

Chair for Dynamics and Vibration
Department of mechanical engineering
Faculty of electrical engineering, mechanical engineering and naval architecture

Members:

dr. sc. Željan Lozina, professor

dr. sc. Damir Sedlar, associate professor

dr. sc. Ivan Tomac, assistant professor

(seconded within HYDRIDE4MOBILITY)

Anđela Bartulović, mag. ing.

Research:

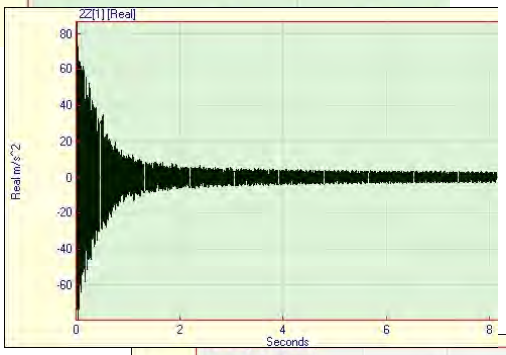
- Numerical methods (meshfree)
- Structural change detection
- Modal analysis
- Wavelet analysis
- Rotordynamics

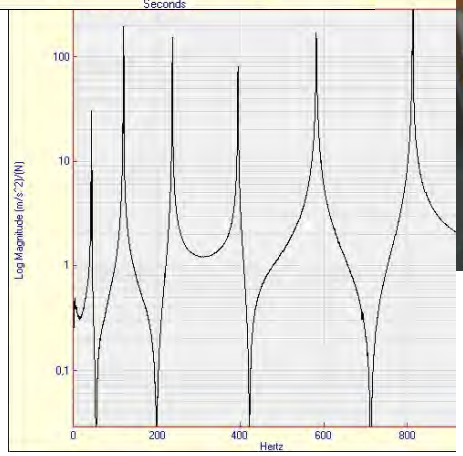
Teaching: Kinematics, Kinetics, C programming, FE method, Vibrations, Experimental Vibrations, Vehicle dynamics

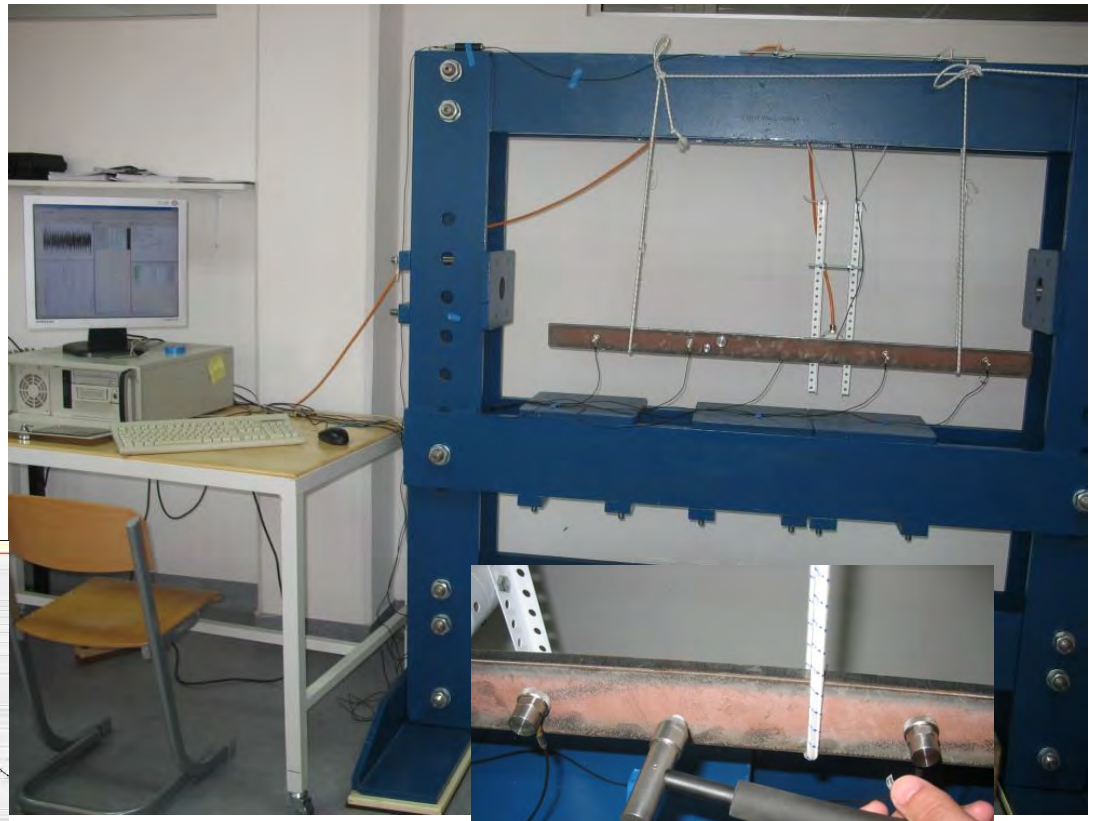
IMPLEMENTATION OF STRUCTURAL CHANGE DETECTION PROCEDURE BASED ON EXPERIMENTAL AND NUMERICAL MODEL CORRELATION (1)

D. Sedlar, Ž. Lozina, D. Vučina

Journal of Sound and Vibration 331 (2012), 13, 3068-3082





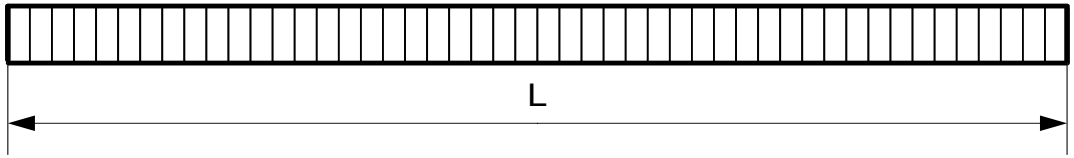


IMPLEMENTATION OF STRUCTURAL CHANGE DETECTION PROCEDURE BASED ON EXPERIMENTAL AND NUMERICAL MODEL CORRELATION (2)

D. Sedlar, Ž. Lozina, D. Vučina

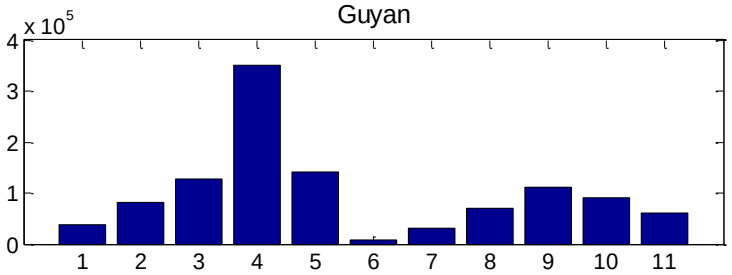
Journal of Sound and Vibration 331 (2012), 13, 3068-3082

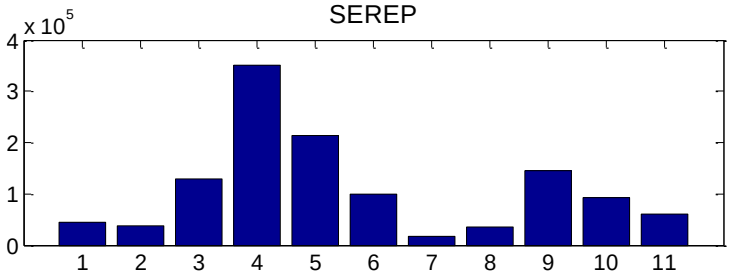
- FE model



- Natural frequencies

ω_{ur} (rad/s)	285.82	787.88	1544.57	2553.25	3814.12	5327.17



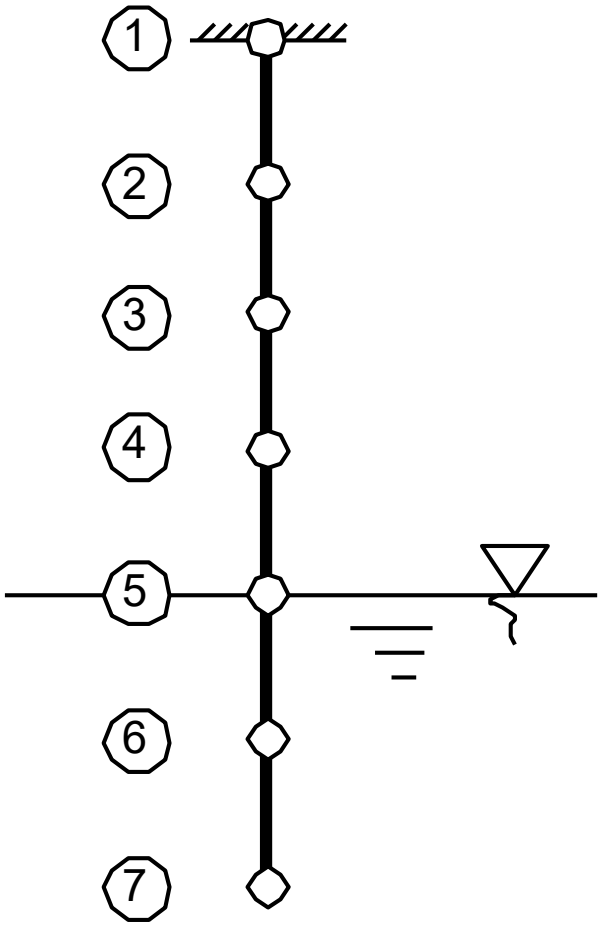


	dodano	detektirano
Δk	0	0.0093
Δm	0.27	0.2904

EXPERIMENTAL INVESTIGATION OF THE ADDED MASS OF THE CANTILEVER BEAM PARTIALLY SUBMERGED IN WATER (1)

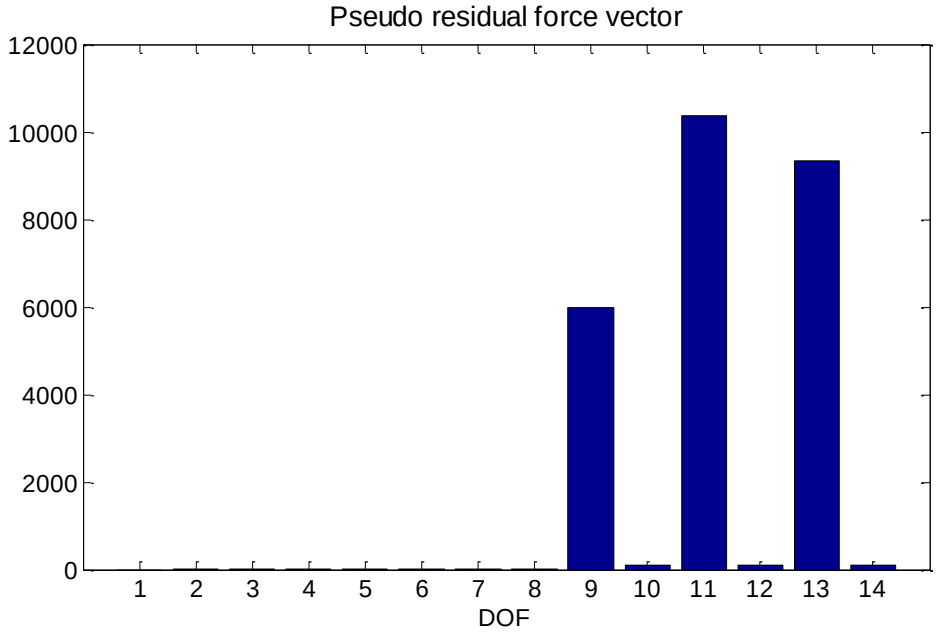
D. Sedlar, Ž. Lozina, D. Vučina

Technical Gazette of University of Osijek, 18 (2011) , 4; 589-594



$$\left(\mathbf{k}-\omega_{wr}^{2}\left(\mathbf{m}+\Delta\mathbf{m}\right)\right)\boldsymbol{\varphi}_{wr}=0$$

$$\left(\mathbf{k}-\omega_{wr}^{2}\mathbf{m}\right)\boldsymbol{\varphi}_{wr}=\underbrace{\omega_{wr}^{2}\Delta\mathbf{m}\boldsymbol{\varphi}_{wr}}_{\mathbf{R}_r}$$



EXPERIMENTAL INVESTIGATION OF THE ADDED MASS OF THE CANTILEVER BEAM PARTIALLY SUBMERGED IN WATER (2)

D. Sedlar, Ž. Lozina, D. Vučina

Technical Gazette of University of Osijek, 18 (2011) , 4; 589-594

- Experimental setup

EXPERIMENTAL INVESTIGATION OF THE ADDED MASS OF THE CANTILEVER BEAM PARTIALLY SUBMERGED IN WATER (2)

D. Sedlar, Ž. Lozina, D. Vučina

Technical Gazette of University of Osijek, 18 (2011) , 4; 589-594

- Experimental setup

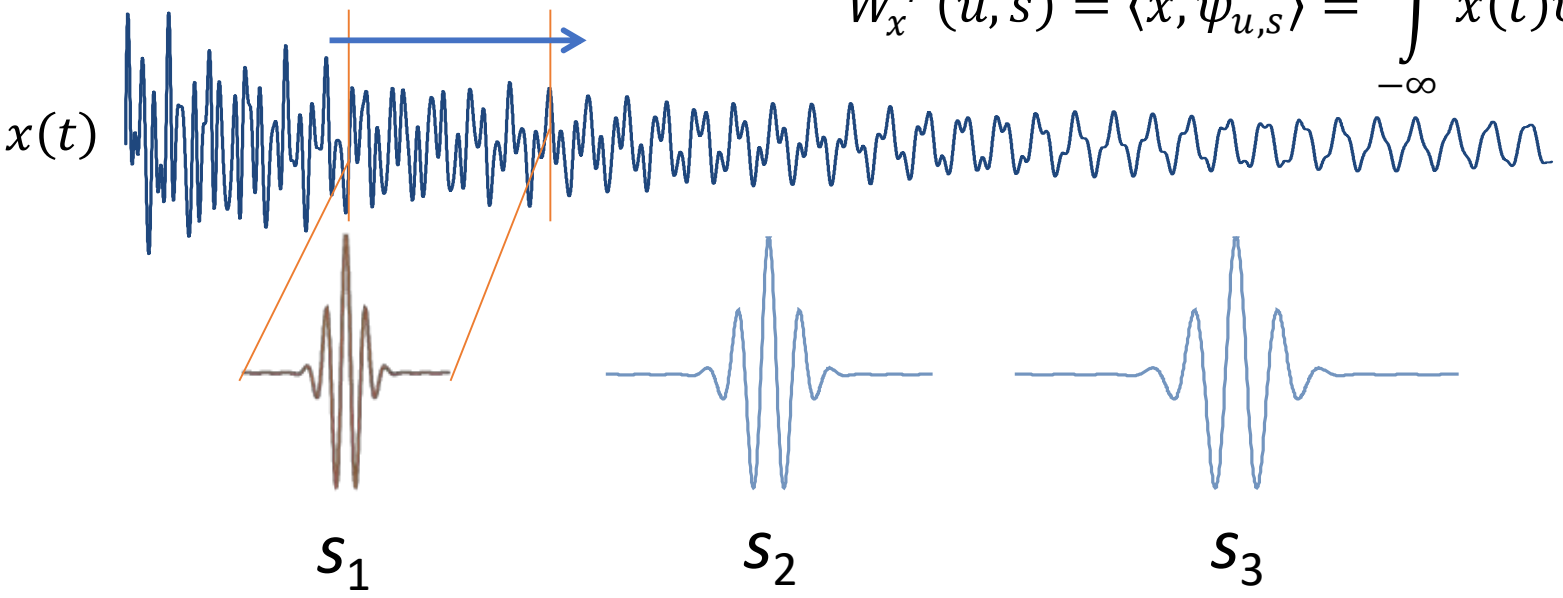
OVERVIEW AND CASE STUDY EVALUATION OF THE TIME-FREQUENCY METHODS FOR THE ESTIMATION OF DAMPING RATIO IN STRUCTURES (1)

I. Tomac, Ž. Lozina , D. Sedlar

Transactions of FAMENA (1333-1124) 35 (2011), 4; 35-64

- Continuous Wavelet Transform

$$W_x^{\psi}(u,s) = \langle x, \psi_{u,s} \rangle = \int_{-\infty}^{\infty} x(t)\psi_{u,s}^*(t)dt$$



- MDOF continuous wavelet transform analytical expression

$$W_{x_k}^{\psi}(u,s) = \sum_{j=1}^{N} \frac{\phi_{kj} A_j \sqrt[4]{\pi\sigma^2 s^2}}{\sqrt{2}} e^{u\zeta_j \omega_{n,j} + \alpha_j(s,\sigma,\eta) - i\left(-u\omega_{d,j} + \beta_{kj}(s,\sigma,\eta)\right)}$$

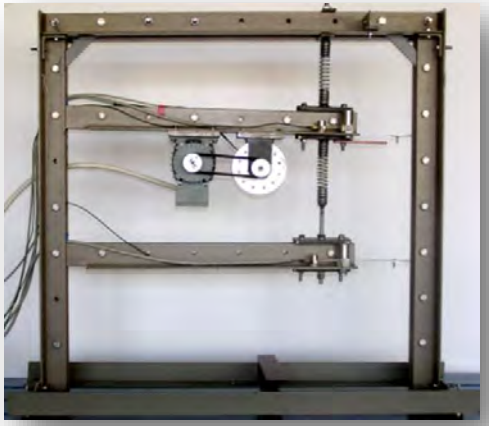
OVERVIEW AND CASE STUDY EVALUATION OF THE TIME-FREQUENCY METHODS FOR THE ESTIMATION OF DAMPING RATIO IN STRUCTURES (2)

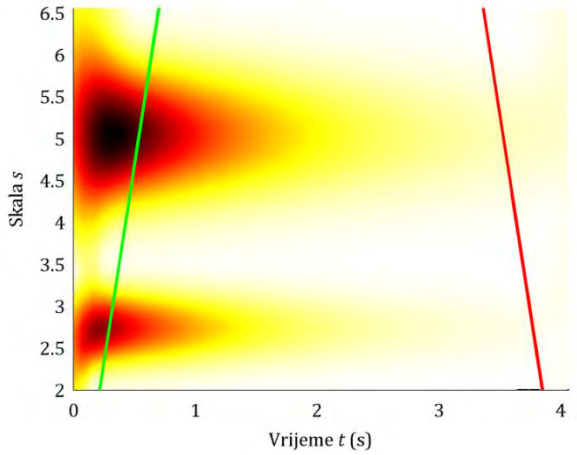
I. Tomac, Ž. Lozina , D. Sedlar

Transactions of FAMENA (1333-1124) 35 (2011), 4; 35-64

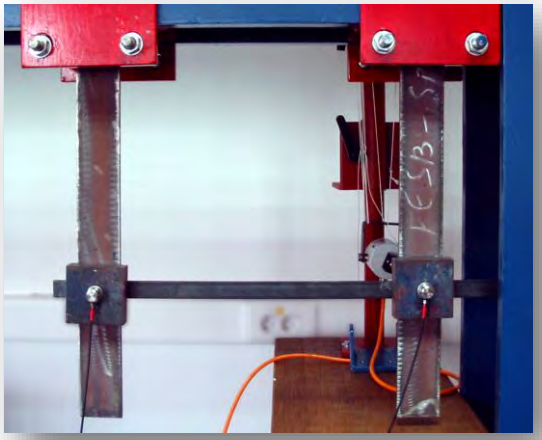
- 2DOF laboratory models

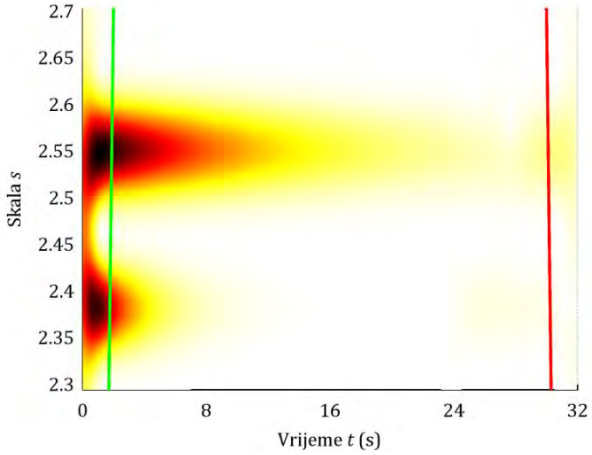
Weakly couppled





Strongly couppled



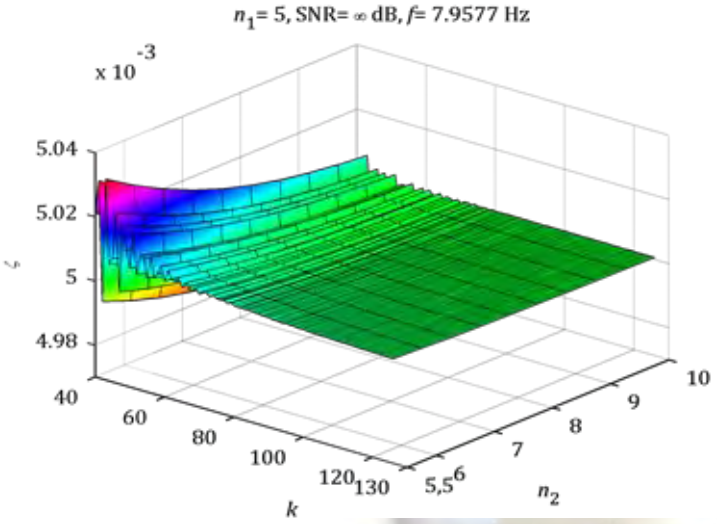


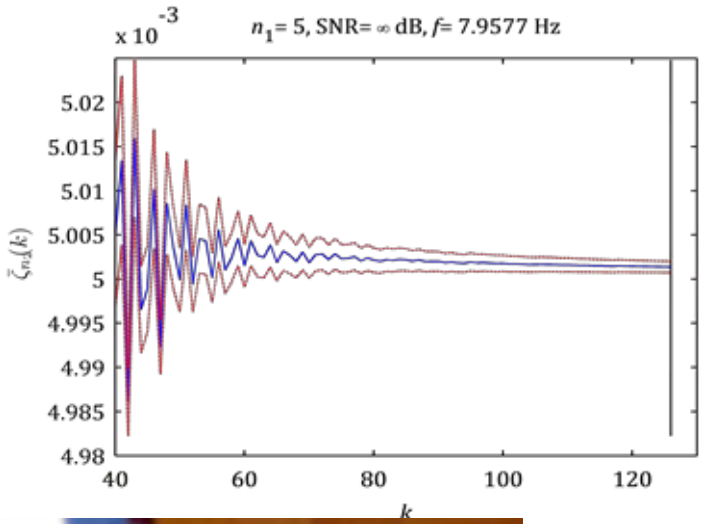
EXTENDED MORLET-WAVE DAMPING IDENTIFICATION METHOD (1)

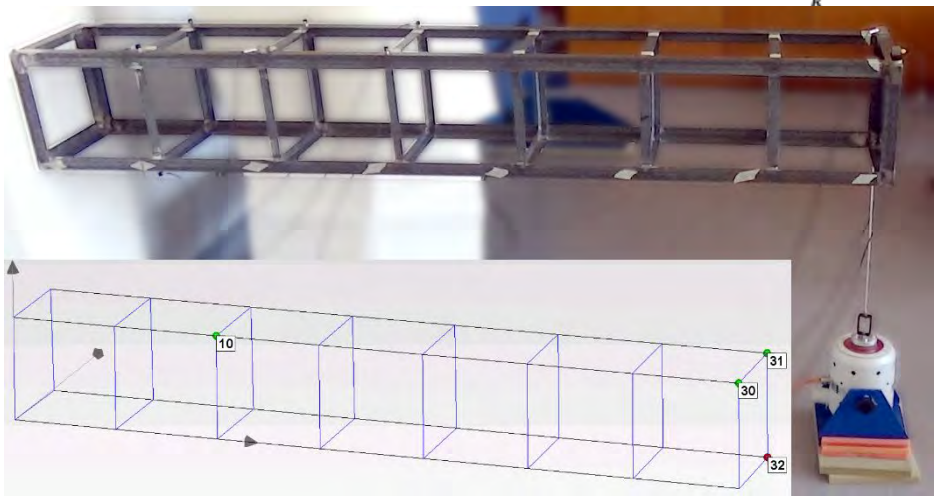
I. Tomac, Ž. Lozina , D. Sedlar

International Journal of Mechanical Sciences, 117 (2017), 31-40

- Strategy for identification of a damping ratio





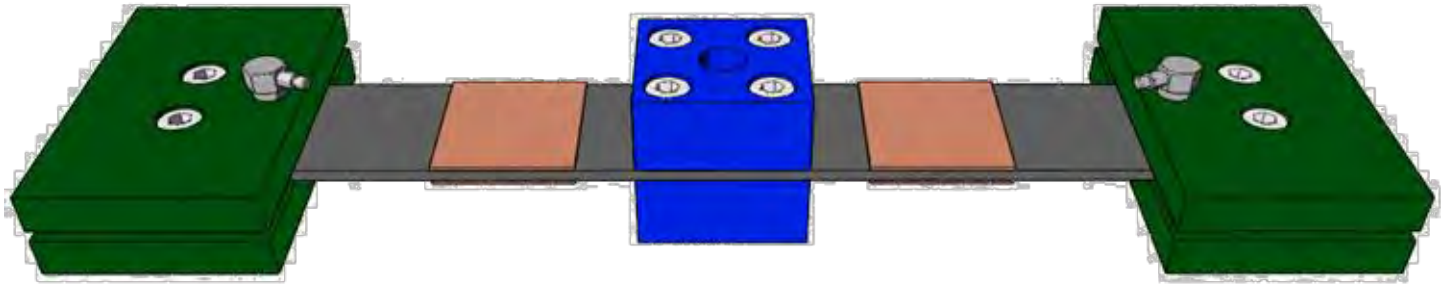


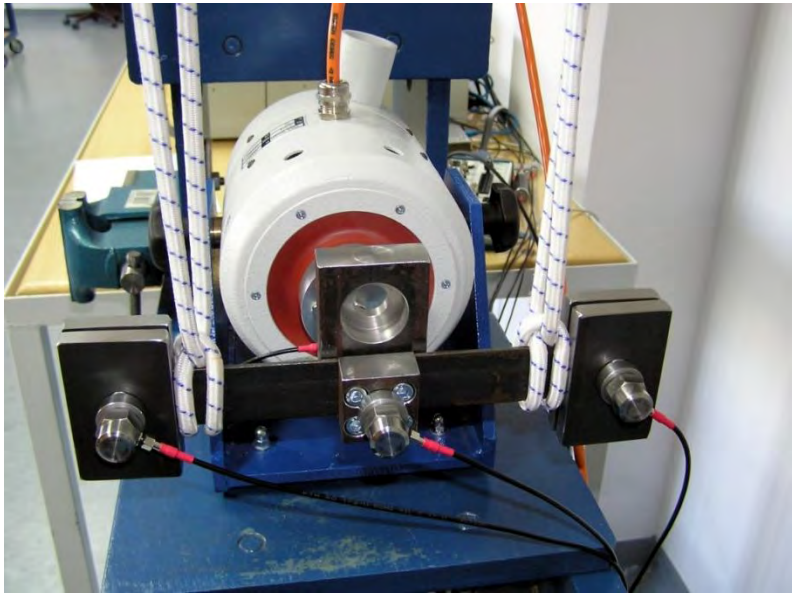
TUNEABLE VIBRATION ABSORBER USING ACCELERATION AND DISPLACEMENT FEEDBACK

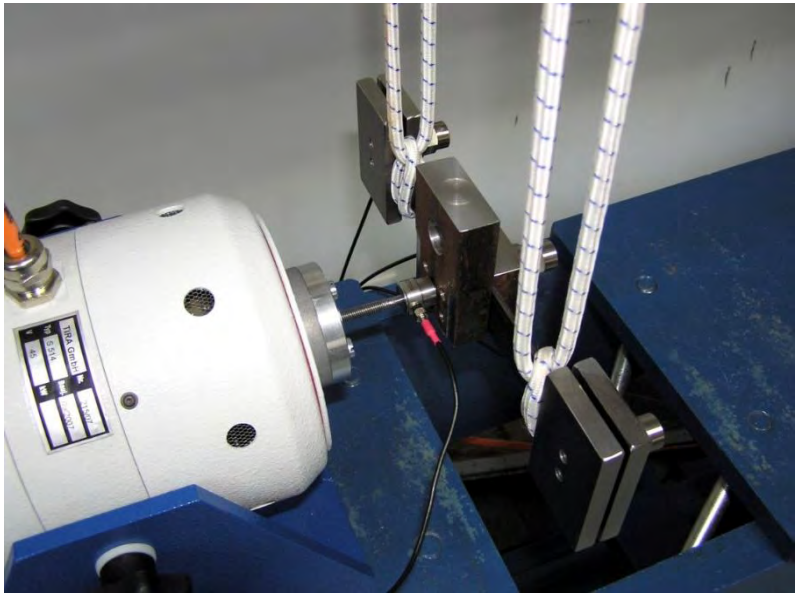
N. Alujević, I. Tomac, P. Gardonio

Journal of Sound and Vibration. 331 (2012), 12; 2713-2728

- Tune natural frequency of the weakly coupled vibration absorber using the piezoelectric strain actuators







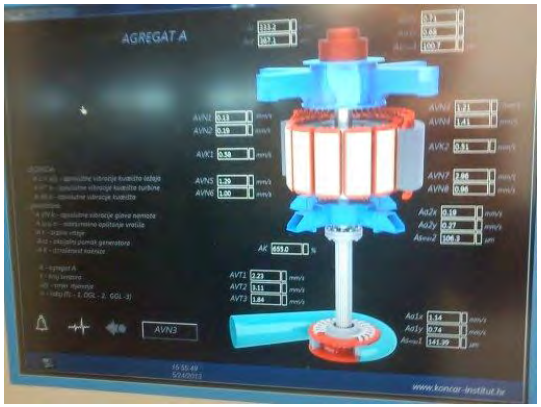
Identification of the unbalanced magnetic pull in Generator at excitation and hydropower machine model validation using SEREP

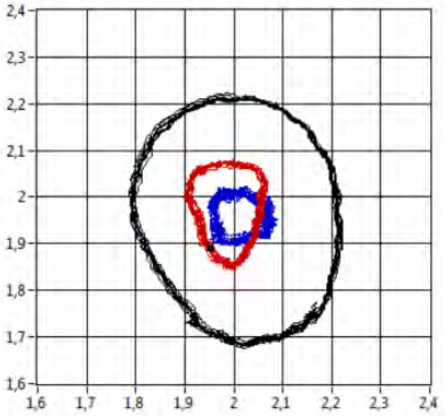
Ž. Lozina , D. Sedlar, I. Tomac

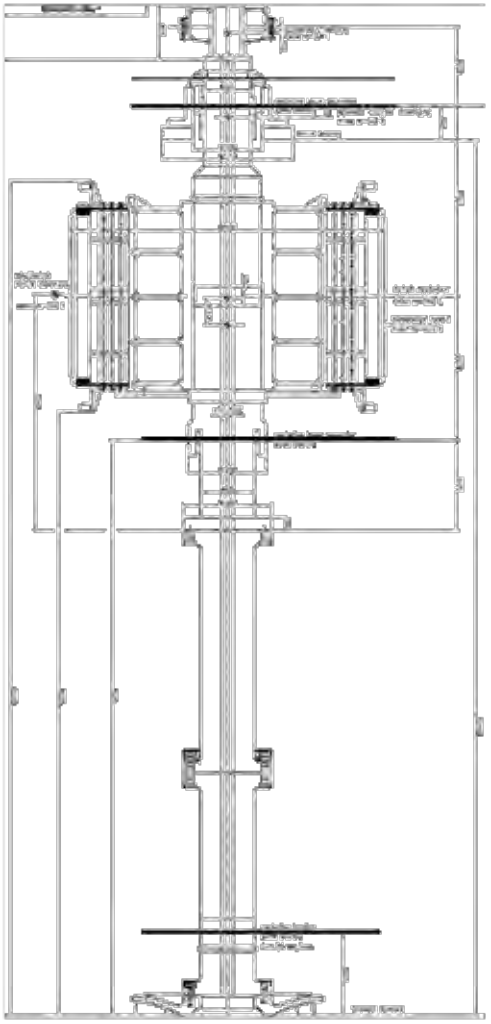
Submitted for publication at VETOMAC 2018 conference

- Identification of unbalanced magnetic pull on the 145MW vertical machine

General data:
Rated power: 145 MW
Shaft speed: 333 o/min
Water flow at rated power: 60 m^3s^{-1}
Working Had: ~ 270 m
Shaft diameter: 870 mm





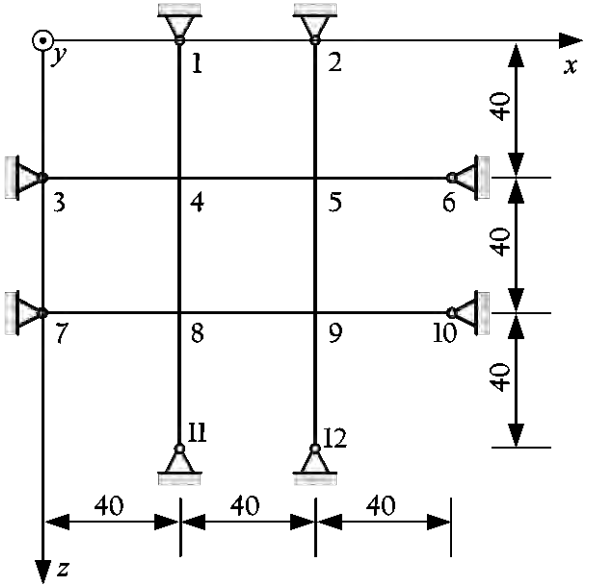


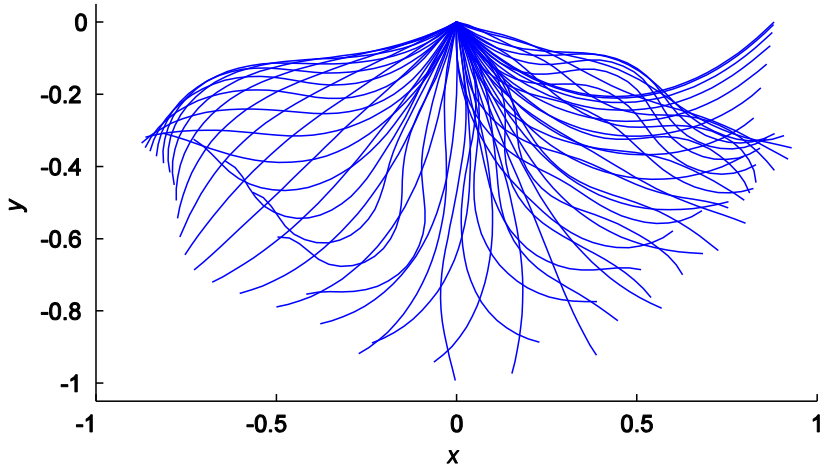
ISOGEOMETRY APPROACH TO THE DYNAMICS OF CATENARY EXPOSED TO THE LARGE DISPLACEMENTS

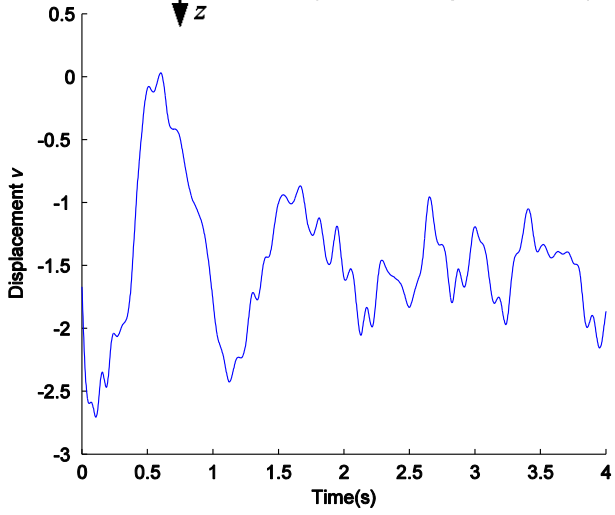
Ž. Lozina , D. Sedlar, I. Tomac

Submitted for publication in Computer Methods in Applied Mechanics and Engin.

- The isogeometric and the Lagrangian approach to the deformable catenary dynamics undergoing large displacements.
- The isogeometric approach to the catenary dynamics proved to be efficient and reliable.







ELECTRO-VIBRATION TESTING OF THE CAR BULBS – Semminar