

ENGINEERING MECHANICS 2023

**29th INTERNATIONAL CONFERENCE
MAY 9-11, 2023, MILOVY, CZECH REPUBLIC**



PROGRAMME OF THE CONFERENCE

Institute of Thermomechanics of the Czech Academy of Sciences

**Institute of Theoretical and Applied Mechanics
of the Czech Academy of Sciences**

**Institute of Solid Mechanics, Mechatronics and Biomechanics,
Faculty of Mechanical Engineering, Brno University of Technology**

ŽĐAS, a.s., Žďár nad Sázavou

Czech Society for Mechanics

IFTOMM Member Committee of the Czech Republic

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**The EM2023 Conference is hosted by the OREA Resort Devět Skal,
Milovy.**

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OREA Resort Devět Skal,

Sněžné - Milovy 11,

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Czech Republic

hotel reception and Registration Desk:

Tel.: +420 566 585 111

www.resortdevetskal.cz

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NAS of Ukraine, Kiev, U

1. GENERAL INFORMATION

ACCOMMODATION

Accommodation has been reserved in the hotel Devět Skal. Please contact kindly the reception of the hotel immediately after your arrival.

BADGES

The participants are kindly requested to wear their badges during the conference to be admitted to scientific sessions, meals, transportation and other services.

BOARDING

Boarding is provided for participants in the hotel restaurant, starting with Tuesday dinner and ending by the lunch on Thursday. Breakfasts are served from 7:00, lunches and dinners are scheduled according to the conference programme. The meal costs are included in the conference fee. The visible conference badge is a sign for the staff to serve you.

CONFERENCE REGISTRATION

The Registration corner of the EM2023 Conference is located in the lobby of the hotel Devět Skal. It is open from 13:00 to 18:30 on Tuesday 9th May 2023, from 8:00 to 18:00 on Wednesday and from 9:00 to 10:30 on Thursday. Accommodation is provided by the hotel reception. For information regarding other hotel services, please contact hotel reception (swimming pool, etc.).

INSURANCE

The Conference Committee is not responsible for the health problems of the participants nor for losses. The visitors from abroad are recommended to take out insurance in the country of their origin.

INTERNET SERVICES

During the whole Conference, internet services will be available in the hotel. Several PCs will be at disposal to the participants, as well as the WIFI coverage of the whole building.

REFRESHMENT

Coffee, mineral water and other refreshment are available during the coffee breaks for all participants. Outside these breaks, snacks can be purchased at the hotel bar (11:00 – 23:00). For other possibilities, please contact the staff of the hotel.

TRANSPORTATION

Transportation from Žďár nad Sázavou to the hotel and back (travel time 30 min.):

- A special coach to Milovy will be leaving Žďár nad Sázavou (bus station in front of the railway station) at 13:45 on 9 May (Tuesday).
- A special coach to Žďár nad Sázavou (bus & railway station) will be leaving hotel Devět Skal approximately at 12:30 on 11 May (Thursday).

- Connections to Žďár nad Sázavou on Tuesday, 9 May 2023:

Brno ÚAN Zvonařka	10:00	→ Žďár n.Sázavou	11:28	Bus 610004 52
Brno hl.n.	12:09	→ Žďár n.Sázavou	13:07	Train RJ 1032 RegioJet
Brno hl.n.	12:20	→ Žďár n.Sázavou	13:28	Train R 982
Praha hl.n.	10:06	→ Žďár n.Sázavou	12:27	Train R 979
Praha hl.n.	10:45	→ Žďár n.Sázavou	12:46	Train RJ 1043 RegioJet

- Connections from Žďár nad Sázavou on Wednesday, 11 May 2023

Žďár n.Sázavou	13:30	→ Praha hl.n.	15:54	Train R 982
Žďár n.Sázavou	14:28	→ Brno hl.n.	15:40	Train R 981
Žďár n.Sázavou	14:47	→ Brno hl.n.	15:46	Train RJ 1035 RegioJet
Žďár n.Sázavou	15:30	→ Praha hl.n.	17:54	Train R 980
Žďár n.Sázavou	16:28	→ Brno hl.n.	17:40	Train R 983
Žďár n.Sázavou	16:30	→ Praha hl.n..	18:54	Train R 978

A public bus is operating between Nové Město na Moravě (bus & railway station) and Sněžné, Milovy (the bus stop at the hotel), fare CZK 22, weekdays:

Nové Město n M., Dopr. term.	5:43	7:08	8:50	11:25	13:34	15:00	16:45	18:20
Sněžné, Milovy	6:12	7:37	9:19	11:54	14:01	15:30	17:14	18:49
Sněžné, Milovy	5:51	6:41	8:31	11:01	12:41	14:26	16:21	
Nové Město n M., Dopr. term.	6:22	7:12	8:59	11:32	13:12	14:51	16:52	

2. SCIENTIFIC INFORMATION

The **ENGINEERING MECHANICS 2023** — 29th International Conference continues in the tradition of the fruitful meetings which have been held in Svatka for many years.

The Programme Committee has selected 61 contributions for the presentation (43 lectures and 18 posters) including two invited keynote lectures. All accepted papers are published in Conference Proceedings “Engineering Mechanics 2023”. The proceedings will be also published on-line on the web page www.engmech.cz.

OFFICIAL LANGUAGE

The official languages of the conference are Czech, Slovak and English. No simultaneous translation is provided. Speakers are kindly asked to present in English if there is someone in the audience who does not understand Czech or Slovak.

LECTURES

The conference includes keynote lectures (plenary session) and parallel sessions in the conference facilities located on the second floor of the Devět skal hotel. The plenary sessions will take place in the main lecture hall (**Conference Hall**), the parallel sections in three smaller lounges (**Lecture Hall I-III**) that are accessible from the Conference Hall.

The presentation of a keynote lecture lasts 50 minutes while that one of a normal lecture 20 minutes including the discussion. The Chairmen of scientific sessions are responsible for keeping the timetable. The presenting authors are kindly asked to contact their Section Chairman at least 10 minutes before starting of the session and to check functionality of their presentation.

The data projector with PC is available in all lecture halls as a standard. No other facilities will be provided, unless the speaker employs its own device – please contact the Secretariat of the Conference. A technician will assist in each of the lecture halls during the whole Conference.

POSTER SESSION

The area for the poster session is reserved in the back of the Conference Hall from Tuesday afternoon. For every paper announced for the poster session, a particular panel of ca. 0.9x1.2m (i.e., A0 format) is assigned and labelled by the number and title of the poster. The fixing material will be available at the place and at the Registration desk.

The authors of the posters exhibited at the Conference can register at the Registration corner to the competition for the Prize of the Managing Director of the ŽĎAS. The participating posters will be labelled by a red sticker. *The only condition for participation is the personal presence of the author at the Award Ceremony.*

The special committee – under chairmanship of Mr. Radek Vlček, MSc., technical director of the ŽĎAS company – will conclude the assessment of the posters exhibited on Wednesday at 14:00. The winners of the competition will be announced and awarded on Wednesday evening at 18:00 before the Conference Dinner.

The authors are kindly asked to dismount their posters by Wednesday evening.

VARIATIONS

The Scientific Committee is entitled to vary the programme if necessary for scientific or technical reasons. If a speaker is missing in the planned time the next speakers take the order and the break after that particular session will be longer.

TECHNICAL EXHIBITIONS

The experimental equipment, instruments, hardware and software relating to engineering mechanics are exposed in the lobby of the hotel.

LIST OF SECTIONS

Section	Abbreviation	Lecture Hall
Keynote Lectures	<i>KEY</i>	Conference Hall
Poster Session	<i>POS</i>	
Dynamics	<i>DYN</i>	Lecture Hall I
Mechanics of Solids	<i>SOL</i>	
Reliability of Structures	<i>REL</i>	Lecture Hall II
Fracture Mechanics	<i>FRA</i>	
Thermomechanics	<i>TER</i>	
Tecnological Processes	<i>TEC</i>	
Fluid Mechanics	<i>FLU</i>	
Biomechanics	<i>BIO</i>	Lecture Hall III
Mechatronics	<i>MTC</i>	

3. CONFERENCE TIMETABLE

T u e s d a y – 9 May 2023		
Hotel lobby		
13:00 - 18:30	Registration of participants	
Plenary session	Conference Hall	
15:00 - 15:30	Opening ceremony	
15:30 - 17:10	Keynote lectures	
17:10 - 17:40	C o f f e e B r e a k	
Parallel sessions 17:40 - 18:30	Lecture Hall I	Lecture Hall II
	<i>DYN</i>	<i>REL</i>
18:30	D i n n e r - Restaurant	

W e d n e s d a y - 10 May 2023				
Parallel sessions 8:30 - 10:00	Lect. Hall I	Lect. Hall II	Lect. Hall III	Hotel lobby
	<i>DYN</i>	<i>FRA</i>	<i>BIO</i>	
10:00 - 10:30	C o f f e e B r e a k			Registration of Participants (Hotel Lobby) 8:00 - 18:00
Parallel sessions 10:30 - 12:00	Lect. Hall I	Lect. Hall II	Lect. Hall III	
	<i>DYN</i>	<i>TER</i>	<i>MCT</i>	Poster Session Conference Hall 8:00 - 18:00
12:00 - 14:00	L u n c h - Restaurant			
Parallel sessions 14:00 - 15:30	Lect. Hall I	Lect. Hall II	Lect. Hall III	
	<i>SOL</i>	<i>TEC</i>	<i>MCT</i>	
15:30 - 16:00	C o f f e e B r e a k			
16:00 - 18:00	F r e e t i m e			
18:00 - 18:30	Announcement of the Poster Session winner - Conference Hall			
18:30 - 23:00	C o n f e r e n c e D i n n e r - Restaurant			

Thursday – 11 May 2023

Parallel sessions 9:30 - 10:45	Lect. Hall I	Lect. Hall II	Hotel lobby Registration of Participants (Hotel Lobby) 9:00 – 10:30
	<i>SOL</i>	<i>FLU</i>	
10:45 - 11:15	Closing ceremony - Conference Hall		
11:30 - 13:30	L u n c h - Restaurant		

4. PROGRAMME OF THE PRESENTATIONS

Tuesday – 9 May 2023 – Conference Hall

15:00 – 15:30 ***Opening Ceremony – Plenary session***

15:30 - 17:10 ***Keynote lectures – Plenary session (KEY)***
chairman: **Petruška J.**

15:30 - 16:20

Burša J., Hrubanová A., Skácel P., Fischer J., Turčanová M.,
Lisický O. 17
**ANISOTROPY OF SOFT BIOLOGICAL TISSUES AND ITS
CONSIDERATION IN CONSTITUTIVE MODELS OF
ARTERIES**

16:20 - 17:10

Isoz M., Kubíčková L., Kotouč Šourek M., Studeník O.,
Kovárnová A. 27
**SIMULATING PARTICLE-LADEN FLOWS: FROM
IMMERSED BOUNDARIES TOWARDS MODEL ORDER
REDUCTION**

17:10 – 17:40

Coffee Break

4.1. Lecture Hall I

Detailed Programme

Dynamics (DYN)

Mechanics of Solids (SOL)

Tuesday – 9 May 2023 – Lecture Hall I

17:40 – 18:30 *Dynamics* chairmen: Musil M. & Zolotarev I. (DYN)

17:40	Bayer J.: ANALYSIS SUGGESTION FOR VEHICLE SCANNING METHOD	39
18:00	Musil M., Úradníček J., Páleník M.: LOCALIZATION OF A LOCAL STIFFNESS DECREASE	171
18:20	Discussion	

18:30 *Dinner - Restaurant*

Wednesday – 10 May 2023 – Lecture Hall I

8:30 – 10:00 *Dynamics* chairmen: Rohan E. & Fischer C. (DYN)

8:30	Medůna O., Vomáčko V., Pustka M., Prošek A.: MODAL CHARACTERISTIC OPTIMIZATION OF THE BLADE OF THE TEST RIG	163
8:50	Šnábl P., Pešek L., Procházka P., Skála V.: A NEW BLADE CASCADE FOR FLUTTER STUDIES	247
9:10	Fischer C., Náprstek J.: CONSISTENCY OF MATHEMATICAL AND EXPERIMENTAL MODEL OF THE AUTOPARAMETRIC SYSTEM	67
9:30	Rohan E., Lukeš V.: DEFORMATION-DRIVEN FLOW IN HOMOGENIZED FLUID-SATURATED POROUS PERIODIC STRUCTURES: NONLINEARITY AND DYNAMIC EFFECTS	215
9:50	Discussion	

10:00 – 10:30 *Coffee Break – hotel lobby*

10:30 – 12:00		Dynamics	chairmen: Kolman R. & Cimrman R.	(DYN)
10:30	Isoz M., Gruber P., Schmidt J., Kubičková L., Štefan J., Kaufman J., Brajer J., Gabriel D.:			103
	CALIBRATED FINITE VOLUME METHOD-BASED SIMULATION FRAMEWORK FOR LASER SHOCK PEENING			
10:50	Kolman R., Kylar J., Kotek V., Cimrman R., Musil L.:			119
	DYNAMICS OF A CANTILEVER BEAM WITH PIEZOELECTRIC SENSOR: EXPERIMENTAL STUDY			
11:10	Cimrman R., Kolman R., Musil L., Kotek V., Kylar J.:			51
	DYNAMICS OF A CANTILEVER BEAM WITH PIEZOELECTRIC SENSOR: FINITE ELEMENT MODELING			
11:30	Šulc P., Pešek L., Bula V., Šnábl P.:			255
	DYNAMIC TENSILE EXPERIMENTS OF HARD RUBBER ON INSTRON TEST MACHINE UNDER FINITE DEFORMATIONS			
11:50	Discussion			
12:00 – 14:00 <i>L u n c h - Restaurant</i>				
14:00 – 15:30		Mechanics of Solids	chairmen: Sládek J. & Gabriel D.	(SOL)
14:00	Parma S., Kovanda M., Chlada M., Štefan J., Kober J., Feigenbaum H. P., Plešek J.:			187
	DEEP LEARNING METHODS FOR THE ACOUSTIC EMISSION METHODS TO EVALUATE AN ONSET OF PLASTIC STRAINING			
14:20	Svárovský J., Parma S., Štefan J., Ciocanel C., Feigenbaum H. P., Marek R., Klepač V., Plešek J.:			243
	DEVELOPMENT OF AUTONOMOUS EXPERIMENTAL SYSTEM TO ANALYSE YIELD SURFACES DISTORTION DUE TO MULTIAXIAL RATCHETING			
14:40	Gabriel D., Gál P., Kotouč M., Dymáček P., Masák J., Kopačka J.:			71
	THERMAL AND CREEP ANALYSIS OF VVER-1000 REACTOR PRESSURE VESSEL AT HIGH TEMPERATURES CAUSED BY FUEL MELTING DURING SEVERE ACCIDENT			
15:00	Sladek J., Sladek V.:			227
	ADVANCED CONTINUUM MODEL FOR THERMOELECTRIC ANALYSES			
15:20	Discussion			
15:30 – 16:00 <i>Coffee Break – hotel lobby</i>				
16:00 – 18:00 <i>Free time</i>				
18:00 - 18:30		Announcement of the Poster Session winner - Conference Hall		
18:30 - 23:00		Conference Dinner - Restaurant		

Thursday – 11 May 2023 – Lecture Hall I

9:30 – 10:45 *Mechanics of Solids* chairmen: Němeček J. & Petruška J. (SOL)

9:30	Chalupová J., Němeček J., Hybášek V., Němeček J.: ESTIMATION OF POROSITY OF CEMENT COMPOSITES FROM ELECTRICAL PROPERTIES AND GENERAL EFFECTIVE MEDIA MODEL	95
9:50	Komlev V., Machacek J.: ANALYSIS OF CABLE-NET SYSTEMS FOR GLASS FACADES	123
10:10	Pařez J., Kovář P.: PREDICTION OF ROTOR THERMAL BOW USING 3D FINITE ELEMENT MODEL	235
10:30	Discussion	

10:45 – 11:15 *Closing Ceremony – Conference Hall*

11:30 *L u n c h - Restaurant*

4.2. Lecture Hall II

Detailed Programme

Reliability of Structures ***(REL)***

Fracture Mechanics ***(FRA)***

Thermomechanics ***(TER)***

Technological Processes ***(TEC)***

Fluid Mechanics ***(FLU)***

Tuesday – 9 May 2023 – Lecture Hall II

17:40 – 18:30 *Reliability of Structures* chairmen: Králík J. & Novák D. (REL)

17:40	Králík J., Králík J. Jr.: PROBABILISTIC ANALYSIS OF THE BUILDING FOUNDATION PLATES CONSIDERING THE SSI EFFECTS	131
18:00	Novák D., Novák L., Spyridis P.: SEMI-PROBABILISTIC APPROACHES FOR ACTION EFFECTS	175
18:20	Discussion	

18:30 *Dinner - Restaurant*

Wednesday – 10 May 2023 – Lecture Hall II

8:30 – 10:00 *Fracture Mechanics* chairmen: Králík J. & Krejsa M. (FRA)

8:30	Středulová M., Eliáš J.: ON THE EFFECT OF FRICTION IN TESTING OF SMALL-SCALE CONCRETE CYLINDERS	239
8:50	Prokop J., Zia A., Hollý I., Ondák, A. EFFECT OF RECYCLED STEEL FIBERS ON THE FRACTURE AND MECHANICAL PROPERTIES OF CONCRETE	211
9:10	Zia A., Zhang P., Holly I., Prokop J. Ondák, A.: APPLICATION OF DISCARDED TIRE STEEL FOR IMPROVING THE SUSTAINABILITY OF CONCRETE STRUCTURES	271
9:30	Discussion	

10:00 – 10:30 *Coffee Break – hotel lobby*

10:30 – 12:00			<i>Thermomechanics</i>	chairmen: Maršík F. & Sládek V.	(TER)
10:30	Zabloudil J., Jegla Z., Freisleben V.: CHALLENGES IN THE THERMAL DESIGN OF LOW-CAPACITY GRATE COMBUSTION CHAMBERS				267
10:50	Musil J., Procházka P., Uruba V.: THE EFFECT OF VARIOUS POSITIONS OF THE STRAIGHT FIN HEAT SINK ON THE ELECTRICAL SWITCHBOARD COOLING				167
11:10	Maršík F., Trávníček Z., Antošová Z.: THE CONNECTION BETWEEN THE PRINCIPLE OF THE LEAST ACTION AND THE THERMODYNAMIC CONDITION OF STABILITY				159
11:30	Sládek V., Sládek J.: HIGHER-GRADE THEORY OF HEAT CONDUCTION AND SIZE EFFECTS				231
11:50	Discussion				
12:00 – 14:00 <i>L u n c h - Restaurant</i>					
14:00 – 15:10 <i>Technological Processes</i> chairmen: Mazurkiewicz A. & Čečrdle J. (TEC)					
14:00	Dubnický L., Šplíchal J., Juračka J.: SAILPLANE WING SECTIONING BASED ON STRUCTURAL WEIGHT				59
14:20	Horpatzká M., Hlinka J.: SUMMARY OF PERSPECTIVES IN ACTIVE SIDESTICKS DEVELOPMENT FOR SMALL AIRCRAFT FLY-BY-WIRE SYSTEMS				91
14:40	Głowacki M., Mazurkiewicz A., Polishchuk O., Kałaczyński T.: METALLIZATION OF 3D PRINTED POLYMER PARTS AS THE METHOD OF IMPROVING ITS PROPERTIES – A MINI-REVIEW				75
15:00	Discussion				
15:30 – 16:00 <i>Coffee Break – hotel lobby</i>					
16:00 – 18:00 <i>Free time</i>					
18:00 - 18:30 <i>Announcement of the Poster Session winner - Conference Hall</i>					
18:30 - 23:00 <i>Conference Dinner - Restaurant</i>					

Thursday – 11 May 2023 – Lecture Hall II

9:30 – 10:45 *Fluid Mechanics* chairmen: Rohan E. & Bublík O. (FLU)

9:30	Bublík O., Heidler V., Pecka A., Vimmr J.: INVESTIGATION OF THE VORTEX-INDUCED VIBRATION BY CONVOLUTION NEURAL NETWORK	47
9:50	Kovář P., Fürst J.: COMPRESSOR CASCADE POSITIVE AND NEGATIVE STALL INCIDENCE ANGLE COR- RELATION MODELLING USING ARTIFICIAL NEURAL NETWORKS	127
10:10	Mačák P., Fürst J.: MODELING THE INFLUENCE OF SURFACE ROUGHNESS ON BOUNDARY LAYER TRANSITION	147
10:30	Discussion	

10:45 – 11:15 *Closing Ceremony – Conference Hall*

11:30 *L u n c h - Restaurant*

4.3. Lecture Hall III

Detailed Programme

Biomechanics

(BIO)

Mechatronics

(MTC)

Wednesday – 10 May 2023 – Lecture Hall III

8:30 – 10:00 **Biomechanics** chairmen: **Burša J. & Sant Z.**

(BIO)

8:30	Gruszka G., Ples M., Wodarski P., Daniec K., Nawrat A., Bereska D., Koterak R., Kosiński P., Wielgoś M.: INNOVATIVE STATION FOR DETERMINING THE PROFILE OF TISSUE PUNCTURE FORCE USING A NEEDLE USED IN AMNIOCENTESIS PROCEDURES	79
8:50	Ples M., Gruszka G., Wodarski P., Daniec K., Nawrat A., Bereska D., Koterak R., Kosiński P., Wielgoś M.: DETERMINING THE PROFILE OF TISSUE PUNCTURE FORCE IN ORDER TO IMPROVE THE IMITATION OF REALITY BY MEDICAL TRAINING DEVICES	195
9:10	Markūnienė I., Janušas G.: PVDF FILM WITH HA, PHA, AGNO ₃ FILLERS FOR BIOCOMPATIBLE PIEZOELECTRIC SENSORS	155
9:30	Sant Z., Pieters M.: REHABILITATION WITH NORDIC POLES OR CRUTCHES?	233
9:50	Discussion	

10:00 – 10:30 *Coffee Break – hotel lobby*

10:30 – 12:00 **Mechatronics** chairmen: **Krejca J. & Polach P.**

(MTC)

10:30	Kałaczyński T., Łukasiewicz M., Liss M., Mazurkiewicz A., Kozłowski R.: ANALYSIS OF INTERNAL COMBUSTION ENGINE SELECTED TEMPERATURE SENSORS DIAGNOSTIC TESTS AND ASSESSMENT OF THEIR TECHNICAL STATE	115
10:50	Krejca J., Vechet S., Chen K.S.: THE INFLUENCE OF FIRST CNN LAYER INITIALIZATION ON TRAINING CONVERGENCE	135
11:10	Podolinský O.: SYSTEM DESIGN OF WATERING ROBOT	203
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Conference Hall

Poster Session

(POS)

Note:

The posters exhibited at the Conference, that meet the Conditions of the Prize, will be accepted into the competition for the **Prize of the Managing Director of the ŽĎAS Company**.

The special committee – under chairmanship of **Mr. Radek Vlček, MSc.**, technical director of the ŽĎAS company – will conclude the assessment of the posters exhibited on **Wednesday at 14:00**.

9 – 10 May 2023 – **Conference Hall**

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chairmen: Formánek M. & Radolf V.

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