

ISAMPE 2019

Proceedings of 2019 International Symposium on Advanced Mechanical and Power Engineering

12-15 December 2019



PUKYONG
NATIONAL UNIVERSITY



Faculty of Engineering
University of Fukui, JAPAN

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ISAMPE2019

Proceedings of 2019 International Symposium on Advanced Mechanical and Power Engineering

12-15 December 2019

Faculty of Engineering
University of Fukui, Japan

Organized by

Mechanical Engineering
Faculty of Engineering
University of Fukui, Japan

School of Mechanical Engineering
College of Engineering
Pukyong National University, Korea

College of Power Engineering
College of Mechanical Engineering
University of Shanghai for Science and Technology, China

Chairman

Prof. Kazutoshi FUKUI, Dean of Faculty of Engineering, University of Fukui

Committee Members of University of Fukui

*Prof. Niro NAGAI; Prof. Futoshi TANAKA; Prof. Noritake HIYOSHI;
Prof. Xiao-Wen LEI; Prof. Tatsuya YOSHIDA*

Committee Members of Pukyong National University

Prof. Seonjin KIM; Prof. Yeonwon LEE; Prof. Inpil KANG

Committee Members of University of Shanghai for Science and Technology

Prof. Hua ZHANG, Prof. Chen JIANG, Prof. Huinan YANG

Symposium Program

Date	Time	Events		
Dec. 12 (Thu.)	19:00	Welcome Party		
Dec. 13 (Fri.)	10:00 - 10:45	Opening Ceremony (Academy hall) Chairperson: Prof. Hiyoshi, N., UF Opening Speech: Dean of Faculty of Engineering, UF : Prof. Fukui, K. Committee members of PKNU, USST Photo Taking		
	10:45 - 11:20	Keynote Lecture: Evaluation of High Temperature Strength of Heat Resistant Steels Used in USC Power Plants Dr. Zhang, Shengde, Materials Science Research Laboratory, Central Research Institute of Electric Power Industry Chairperson: Prof. Hiyoshi, N., UF		
	11:20 - 12:30	Lunch time (UF COOP Cafeteria)		
	12:30 - 13:30	Poster session (Integrated Research Building IV, 2F) Chairperson: Prof. Yoshida, T., UF		
	13:30 - 14:50	Room A 221M Materials, Design and Manufacturing System Eng.	Room B 223L Heat and Mass, Fluid, Power Eng.	Room C 224M Heat and Mass, Fluid, Power Eng.
		Coffee break		
	15:10 - 16:10	Room A 221M Materials, Design and Manufacturing	Room B 223L Heat and Mass, Fluid, Power Eng.	Room C 224M Heat and Mass, Fluid, Power Eng.
		Coffee break		
	16:30 - 17:30	Room A 221M Materials, Design and Manufacturing	Room B 223L Heat and Mass, Fluid, Power Eng.	Room C 224M Heat and Mass, Fluid, Power Eng.
		Free time		
	17:45 - 19:45	Banquet (UF COOP Cafeteria)		
Dec. 14 (Sat.)	9:00~	Optional Technical Tour		
Dec. 15 (Sun.)		Return Flight		

Technical Program

Session : System Eng., Materials, Design and Manufacturing

Room A : Integrated Research Building IV, 2F, 221M

Chairpersons : Xiao-Wen LEI (UF), Cheng JIANG (USST)

Time	TITLE & AUTHORS	p.
13:30 - 13:50	A Fracture Mechanics Approach to Wear Mechanism of Ceramics under Non-conformal Friction Seock-Sam Kim (UMS)	1
13:50 - 14:10	VISION-GUIDED TRAJECTORY PLANNING FOR AN ARTICULATED MANIPULATOR USING VISUAL SERVOING TECHNIQUE Patel Chetan Chunilal, Jotje Rantung, Dong-Yeong Kim, Sang-Kwun Jeong, Sea-June Oh, Hak-Kyeong Kim, and Sang-Bong Kim (PKNU)	2
14:10 - 14:30	A ROBUST CONTROLLER DESIGN FOR NETWORKED HYDRAULIC PRESSURE CONTROL SYSTEM BASED ON CPR Wei Shen, Jiehao Wang (USST)	10
14:30 - 14:50	DEFORMATION ANALYSIS OF LOW-DIMENSIONAL NANOCARBON MATERIALS FORCING HIERARCHY OF LATTICE DEFECTS Ako KIHARA and Xiao-Wen LEI (UF)	20
Coffee break		
15:10 - 15:30	A GEP-BASED METHOD FOR THERMAL DEFORMATION MODELING OF SPINDLE IN MACHINE TOOL Qiang Li and Hao-Lin Li (USST)	22
15:30 - 15:50	LOW CYCLE FATIGUE BEHAVIOR OF ALLOY 800H BASE AND WELD METAL S AT 750°C Seon-Jin Kim, Seon-Gi Lee, Se-Hee Oh, Woo-Gon Kim and Eung-Seon Kim (PKNU)	35
15:50 - 16:10	Dispersion of Magnetic Compound Fluid and Its Effect on Polishing Properties of BK7 Optical Glass Hao Yu and Jiang Chen (USST)	38
Coffee break		
16:30 - 16:50	CHARACTERIZATION OF LOW CYCLE FATIGUE PROPERTIES OF ALLOY 800H AT 850°C Seon-Jin Kim, Yuen Xia, Seon-Gi Lee, Woo-Gon Kim and Eung-Seon Kim (PKNU)	46
16:50 - 17:10	A NEW HIGH-TEMPERATURE EXPERIMENTAL METHOD BASED ON A THERMALLY-COUPLED ANALYTICAL SOLUTION AND 3D-DIC Lei Hu, Yu-Jia Hu and Hao-Lin Li (USST)	49
17:10 - 17:30	A Study on Characteristic Evaluation Technique for Jounce bumper of vehicles using Carbon-nanotube load cell Baek Gyu Choi, Gwang-won Oh, Yeong-sik Kim and Inpil Kang (PKNU)	55

Technical Program

Session : Heat and Mass, Fluid, Power Eng.

Room B : Integrated Research Building IV, 2F, 223L

Chairpersons : Niro NAGAI (UF), Wei LU (USST)

Time	TITLE & AUTHORS	p.
13:30 - 13:50	ANALYSIS OF UNSTEADY FLOW STRUCTURES INSIDE CENTRIFUGAL IMPELLER USING PROPER ORTHOGONAL DECOMPOSITION Zhen-Yang Liao, Jun Yang, Jun Liu, Xiao-Rui Deng and Wen-Li Hu (USST)	57
13:50 - 14:10	MEASUREMENT OF SOOT PARTICLES BY TWO-COLOR LASER-INDUCED INCANDESCENCE METHOD COMBINED WITH CAVITY RING-DOWN SPECTROSCOPY Meng Wang, Yan-Feng Zhang, Jun Chen, Hui-Nan Yang, Ming-Xu Su, Xiao-Shu Cai (USST)	66
14:10 - 14:30	Numerical Study on the Separation Characteristics in PWR Swirl-vane Steam Separator by Using Particle Tracking Method Hong-Wu Zhao, Jun-Ho Jeon and Yeon-Won Lee (PKNU)	71
14:30 - 14:50	NUMERICAL ANALYSES OF GAS-SOLID HETEROGENEOUS REACTION AND TRANSPORT PROCESSES IN CHEMICAL LOOPING COMBUSTION WITH COPPER-BASED OXYGEN CARRIER OF LARGE PARTICLES Guanping Huo and Xueyan Guo (USST)	75
Coffee break		
15:10 - 15:30	THERMODYNAMIC ANALYSIS OF LOW GWP ALTERNATIVES IN HIGH TEMPERATURE HEAT PUMP: HFO1336mzz(Z) AND HFO1233zd(E) Yang Meng, Zhang Hua, Zhao Wei, Qin Yan-Bin and Huang Jie (USST)	84
15:30 - 15:50	LUBRICATION ANALYSIS OF JOURNAL BEARINGS USING CFD Kyeong-Hwan Kim, Min-Kyeong Kim, Young-Kyu Park, Chakma Palash, Zhao Hongwu, Yeon-Won Lee (PKNU)	91
15:50 - 16:10	DEVELOPMENT OF A SERS-BASED DIAGNOSTIC METHOD FOR CORONARY HEART DISEASE WITH URINE Huinan Yang, Mengmeng Xing, Wenyu Qiao, Chengfang Luo and Xiaoshu Cai (USST)	94
Coffee break		

Technical Program

Session : Heat and Mass, Fluid, Power Eng.

Room B : Integrated Research Building IV, 2F, 223L

Chairpersons : Niro NAGAI (UF), Wei LU (USST)

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16:30 - 16:50	PERFORMANCE OF A NOVEL DOMESTIC WATER PURIFICATION SYSTEM BASED ON HUMIDIFICATION-DEHUMIDIFICATION PRINCIPLE Qun-dong ZHU, Wei-dong WU, Kun LI, Hao HU (USST)	97
16:50 - 17:10	THE EXPERIMENTAL STUDY ON VORTEX STRUCTURES IN TURBULENT BOUNDARY LAYER Yanang Guo, Xiangrui Dong, Xiaoshu Cai and Wu Zhou (USST)	104
17:10 - 17:30	EXPERIMENTAL RESEARCH ON 3D PARTICLE TRACKING VELOCIMETRY BASED ON LIGHT FIELD IMAGING Huifang Liu, Wu Zhou and Xiaoshu Cai (USST)	111

Technical Program

Session : Heat and Mass, Fluid, Power Eng.

Room C : Integrated Research Building IV, 2F, 224M

Chairpersons : Futoshi TANAKA (UF), Wu ZHOU (USST)

Time	TITLE & AUTHORS	p.
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13:50 - 14:10	EXPERIMENTAL STUDY ON DYNAMIC PHASE EQUILIBRIUM OF CO₂-[emim][Tf₂N] UNDER FLOW STATE Kun Li, Wei-dong Wu, Ying-ying Yang, Tu-wei Liao (USST)	128
14:10 - 14:30	MODEL VALIDATION OF ATTENUATION OF THERMAL RADIATION IN WATER SPRAYS Shogo Noda and Futoshi Tanaka (UF)	137
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15:10 - 15:30	A NOVEL CAPACITY ESTIMATION METHOD FOR LITHIUM-ION BATTERIES USING FUSION ESTIMATION OF CHARGING CURVE SECTIONS AND DISCRETE ARRHENIUS AGING MODEL Yuejiu Zheng, Chao Qin, Xin Lai and Xuebing Han (USST)	148
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16:30 - 16:50	IN SITU MEASUREMENT OF SODIUM ACETATE CRYSTALLIZATION PROCESS Nan Jia, Chang Tian and Ming-xu Su (USST)	182
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Technical Program

Poster Session : 12:30 ~ 13:30

Integrated Research Building IV, 2F

Chairperson : Tatsuya YOSHIDA (UF)

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2	RESEARCH ON THE SEGMENTATION METHODS FOR CORE PARTICLE COLOR IMAGES Wenjing Deng, Wu Zhou and Xiaoshu Cai (USST)	193
3	CONSTRUCTION OF CARBON FIBER ATOMIC MODEL AND ANALYSIS OF MECHANICAL PROPERTIES USING MOLECULAR DYNAMICS METHOD Kiyomori NOJIRI and Xiao-Wen LEI (UF)	198
4	MECHANICAL PROPERTIES ANALYSIS OF DIAMOND NANOTHREADS WITH LATTICE DEFECTS BY MOLECULAR DYNAMICS METHOD Kazuki BANDO and Xiao-Wen LEI (UF)	201
5	THERMALLY COUPLED CONSTITUTIVE RELATIONS OF THERMOELASTIC MATERIALS AND DETERMINATION OF THEIR MATERIAL CONSTANTS BASED ON DIGITAL IMAGE CORRELATION WITH A LASER ENGRAVED SPECKLE PATTERN Yu-Jia Hu and Jian-Min Zhu (USST)	204
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7	Customized Test Set-up for the Evaluation of Bone-Conduction Device Chan-Jung Kim, Inpil Kang, Jeong-Hyun Sohn, Seon-Jin Kim and Byung-Tak Kim (PKNU)	217
8	Study on vibration characteristics of vibration isolation bed Masanori Shintani and Souta Mizuno (UF)	220
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Technical Program

Poster Session : 12:30 ~ 13:30

Integrated Research Building IV, 2F

Chairperson : Tatsuya YOSHIDA (UF)

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13	TRAJECTORY TRACKING FOR CATERPILLAR VEHICLES USING A BACKSTEPPING CONTROLLER Van Lanh Nguyen, Sung-Won Kim, Dae-Hwan Kim, Choong-Hwan Lee, Min-Shaeng Shin, Hak-Kyeong Kim and Sang-Bong Kim (PKNU)	246
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16	STUDY OF HEAT TRANSFER CHARACTERISTICS OF SUPERCRITICAL CO₂ COOLING IN SPIRALLY FLUTED TUBE-IN-TUBE HEAT EXCHANGERS Zhong-Yang Yu, Le-Ren Tao, Li-Hao Huang, Su-Han Zhang (USST)	256
17	Behavior of acoustic streaming in a solid-liquid mixture (Orgasol, aluminum flake, and aluminum cut pieces) Takuto Kino, Tetuya Higashikawa, Takuto Kozaki, Ryouta Nishizima, and Junichi Ohta (UF)	266
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19	EVALUATION OF HEAT TRANSPORT CHARACTERISTICS AT GAS-LIQUID INTERFACE Yoshiki Akahori, Niro Nagai and Akinori Fukushima (UF)	276
20	EFFECT OF ASH DEPOSITION ON FURNACE HEAT TRANSFER OF 660MW FIRED HIGH COAL BOILER LIU Zhongyi, JIN Jing, ZHANG Binbin, HOU Fengxiao, ZHU Yizhou, ZHENG Liangqian (USST)	279

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Poster Session : 12:30 ~ 13:30

Integrated Research Building IV, 2F

Chairperson : Tatsuya YOSHIDA (UF)

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22	MOLECULAR DYNAMICS SIMULATION OF WETTING BEHAVIORS OF SESSILE WATER-Cu NANO-DROPLET ON COPPER SUBSTRATE Zhao Wang and Ling Li (USST)	291
23	INVESTIGATION OF TEMPORAL VARIATIONS OF TURBULENCE IN VISCOELASTIC FLUID BY DNS Akihiro Hayashi and Takashi Ohta (UF)	298
24	EXPERIMENTAL INVESTIGATION OF STORAGE BOX USING PHASE CHANGE MATERIALS FOR FREEZING FOOD Li Wang, Wei Lu, Xiang-HaiXing and Shuai-Nan Zhai (USST)	302
25	EVALUATION OF FIRE COOLING PERFORMANCE BY WATER SPRAYS USING MODEL-SCALE EXPERIMENTS Haruki Tomita, Tasuku Ishikawa, Futoshi Tanaka (UF)	309
26	EXPERIMENTAL STUDY OF AN INNOVATIVE HIGH-TEMPERATURE PHASE CHANGE THERMAL STORAGE SYSTEM WITH PHASE CHANGE MATERIALS FOR INDOOR HEATING Shuai-Nan Zhai, Wei Lu, Shu-Qian Bi, Xiang-Hai Xing and Li Wang (USST)	312
27	SIMPLE MODEL FOR PREDICTING THE FIRE SPREAD IN A TUNNEL FIRE Riku Hashimoto, Masaya Kuroda, Futoshi Tanaka (UF)	318
28	Experimental and numerical studies on the velocity and temperature deviation in a 1000 MW tangentially fired boiler Wenshuai Wang, Mo Yang and Wenhua Liu (USST)	320
29	GHOSTING FLAME INDUCED BY SMOKE FALLING IN A TUNNEL FIRE Masashi Misawa, Tasuku Ishikawa and Futoshi Tanaka (UF)	332

Optional Technical Tour

Date	Time	Events
Dec. 14 (Sat.)	9:00	Depart from hotel (meeting point: 1st floor) We will pick you up at your hotel. "1-hour bus ride"
	10:00 - 11:30	①Fukui Prefectural Dinosaur Museum (FPDM) https://www.dinosaur.pref.fukui.jp/en/ The FPDM exhibits a number of specimens on geology and paleontology, such as invertebrate fossils, minerals, rocks and of course dinosaurs. "40 minutes bus ride"
	12:10 - 14:10	Lunch, and ②Eiheiji-temple https://daihonzan-eiheiji.com/en/ Eiheiji, "The Temple of Eternal Peace", is one of the two head temples of Soto Zen. "1-hour bus ride"
	15:00 - 17:30	③Free shopping at mall
	18:00	Arrive at hotel

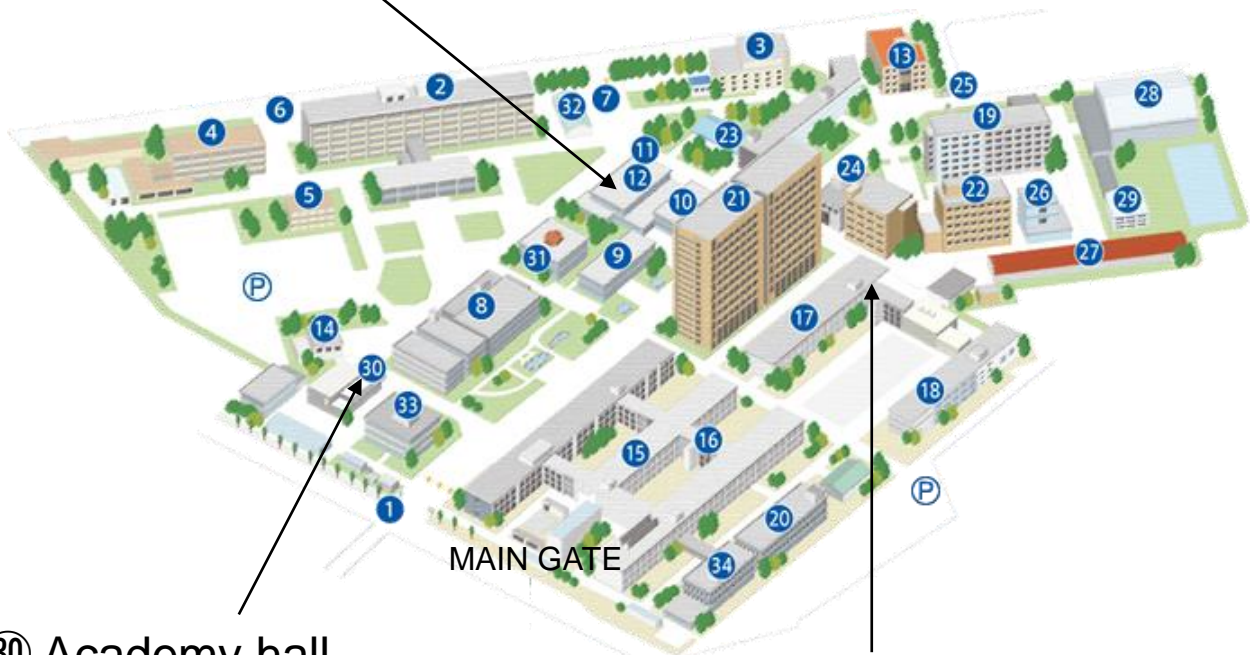
MAP

Access to University of Fukui



⑫ UF COOP Cafeteria

Banquet



③⑩ Academy hall

Opening Ceremony, Keynote Lecture

⑪ Integrated Research Building IV

2F : Poster session, Room A, Room B, Room C, Coffee Break

