# 第一屆

測試技術與智能儀器國際學術討論會

# 論 文 集

THE FIRST INTERNATIONAL
SYMPOSIUM ON MEASUREMENT
TECHNOLOGY AND INTELLIGENT
INSTRUMENTS PROCEEDINGS

華中理工大學出版社

HUAZHONG UNIVERSITY OF SCIENCE AND TECHNOLOGY PRESS

#### THE FIRST INTERNATIONAL SYMPOSIUM

ON

#### MEASUREMENT TECHNOLOGY AND INTELLIGENT INSTRUMENTS

MAY 15-17,1989

WUHAN, CHINA

#### The Symposium is organized by:

Huazhong University of Science and Technology, China The University of Birmingham, UK Hubei Society for Measurement, China

#### Sponsored .by:

Chinese University and College Society for Interchangeability and Measurement Technology

#### Co-sponsored by:

Tsinghua University
Tianjin University
Zhejiang University
Chongqing University
Shanghai Jiaotong University
Xi'an Jiaotong University
Harbin Institute of Technology
Jilin University of Technology
Tongji University
Taiyuan University of Technology
Northeast University of Science and Technology
Northwest Polytechnic University
Hefei Polytechnic University
Southeast University
National University of Defense Technology
Hubei Institute of Technology
Hubei Committee of Science and Technology
Hubei Committee of Science and Technology
Hubei Committee of Science and Technology
Hubathong University of Science and Technology

### Donated by:

National Science Foundation of China
China Society for Measurement
Ono Sokkico., Ltd., Japan
Cochlea Corp., USA
Scientific Instrument Factory of Chinese Academy of Sciences
Hubei Bureau of Metrology
Hubei Bureau of Standard
Hubei Research Institute of Measurement
Wuhan Society for Measurement
Wuhan 99 Research Institute of Science and Technology

## CONTENTS

Se	38	io	n	A

۱.	A FAST ROUNDNESS ALGORITHM FOR IN-PROCESS GRINDING CONTROL H. Kaliszer (1), Y. Gao (2), J. Webster (1) (1) The University of Birmingham, UK (2) Huazhong University of Science and Technology, CHINA	1
2.	A SURFACE ROUGHNESS AUTOMATIC TESTER YOU Zheng, LI Zhu, LI Guangyin (1), GUO Tingxi, WANG Yuhuei (2) (1) Huazhong University of Science and Technology, CHINA (2) Scientific Instrument Factory The Academy of Sciences of China, CHINA	9
3.	AUTOMATIC MEASUREMENT OF FINE SURFACE ROUGHNESS IN ULTRA-PRECISION DIAMOND TURNING Takashi MIYOSHI and Katsumasa SAITO Hokkaido University, JAPAN	13
4.	ON-LINE MEASUREMENT AND IDENTIFICATION OF MACHINED SURFACE MORPHOLOGY ZHANG Honghai, CHEN Zhixiang and CHEN Riyao Huazhong University of Science and Technology, CHINA	19
5.	ON LINE IDENTIFICATION OF THE TIME RESPONSE OF SHEATHED THERMOCOUPLES B.Sarnes, B.Schrüfer INSTITUT FUR AUTOMATIONSTECHNIK - TECHNISCHE UNIVERSITAT MUNCHEN, F.R.Germany	80
6.	ULTRASONIC MEASUREMENT OF ROBOT MOTION Shuyuan MA (1), Hideharu Omada and Akira Shimokohbe (2), Yasuyuki Matsuo (3) (1) Tsinghua University, CHINA (2) Tokyo Institute of Technology, JAPAN (3) Keio University, JAPAN	786
7.	USING A LASER TO MEASURE THE SPACING OF THE PROFILE IRREGULARITIES MA He, WANG Chengjun and ZHANG Yin Fuxin Mining Institute, CHINA	24
в.	NON CONTACT ROUGHNESS MEASUREMENT BY COMPUTER VISION Lo Casto S., Lo Valvo E. and Ruisi V. Universita di Palermo, ITALY	28
9.	BVALUATION OF SPHERICITY ERROR JIANG Zhuangde, ZHAO Zhuoxian Xi'an Jiaotong University, CHINA	35
10.	A NEW ALGORITHM AND ITS APPLICATION IN THE MEASUREMENT OF ROUNDNESS WU Zifang, FAN Yujian, ZHAO Zhuoxian Xi'an Jiaotong University, CHINA	40
11.	THE CONTINUOUSLY SCANNING MEASUREMENT OF FLATNESS ERROR AND FAST APPROXIMATING ALGORITHM OF EVALUATING FLATNESS ERROR WANG Yurong (1), XIE Huichong (1), LU Xiaoming (2) (1) Northwestern Polytechnical University, CHINA (2) Nanjing Aeronautical College, CHINA	44
12.	OPTIMIZATION METHODS FOR THE EVALUATION OF FORM AND POSITION ERRORS OF CYLINDRIC SURFACES  FAN Yujian (1), ZHAO Zhuoxian (1), WANG Liping (2) and ZHAO Zexiang (3) (1) Xi'an Jiactong University, CHINA (2) University of Cincinnati, U.S.A. (3) Zhengzhou Textile Polytechnic College, CHINA	51
13.	A HIGH-SPEED ACCURATE ALGORITHM OF MINIMUM ZONE REFERENCE CIRCLES AND ROUNDNESS ERRORMETHOD OF CROSS CHORDS CHE Rensheng, SUN Yuqin, TAN Jiubin Harbin Institute of Technology, CHINA	53

14.	THE EFFECT OF THE POSITION OF WOLLASTON PRISM ON MEASURING PRECISION OF INTERFEROMETER WITH DOUBLE FREQUENCY LASER LI Pengsheng, LI Hua Harbin Institute of Technology, CHINA	55
15.	THE STUDY OF AN INTELLIGENT MEASUREMENT SYSTEM FOR MEASURING LATHE'S STRAIGHT MOTION ERROR AND STRAIGHTNESS OF WORKPIECE YU Feng and LIU Zhongsheng Jilin University of Technology, CHINA	56
16.	THE ON-LINE MEASUREMENT OF THE COAXALITY ERROR OF LARGE DIMENSION ECCENTRIC SHAFT ZHANG Jiwei, ZHANG Kuiwei, XIAO Guoxian, ZHANG Yu and JIANG Cheng Northeast University of Technology, CHINA	60
17.	THE ON LINE MEASUREMENT OF ROUNDNESS YU Qiuen, FU Jingshun, ZHANG Guiying and XU Xiuhui Shenyang Polytechnic University, CHINA	64
18.	THE ANALYTICAL EVALUATION OF PERPENDICULARITY ERROR OF AXIS WITH PRESPECT TO END SURFACE AND DATA PROCESSING WITH MICROCOMPUTER ZHANG Yu, LIU Ping Northeast University of Technology, CHINA	66
19.	GEOMETRICAL DEVIATION DATA PROCESSION SYSTEM USING PORTABLE PC-1500A COMPUTER ZHUO Xingren (1), YUAN Jixin, SONG Yun, LIN Meizhen, WU Xiwen and SHI Shuxi (2) (1) Beijing Polytechnic University, CHINA (2) Standardization Institute of Machinery Commission, CHINA	70
20.	COMPUTER GENERATED HOLOGRAMS FOR ROBOT VISION  2. Yilbas, B. S. Yilbas, K. Kiymik, S. Özsoy  Brciyes Universitesi, TURKEY	807
21.	A NEW-TYPE INTELLIGENT FLATNESS MEASURING DEVICE LIU Jun and LI Shiheng Ordnance Engineering Institute of the People's Liberation Army, CHINA	71
22.	RESEARCH ON THE THEORY AND METHOD OF AUTOMATIC COMPREHENSIVE MEASUREMENT OF SIZE-FORM ERRORS OF DEEP HOLES YUAN Chang liang and GAO Zhenpin Taiyuan University of Technology, CHINA	73
23.	AUTOMATIC PART SETTING BY USING INVERSE-MOIRE METHOD Hengzheng LU, Takashi MIYOSHI, Katumasa SAITO Hokkaido University, JAPAN	808
24.	ROBOT CALIBRATION POSE MEASUREMENT FOR INACCURACY MAPPING Edward Red, Brady Davies, Xuguang WANG Brigham Young University, USA	760
25.	3-D ROBOT VISION: THE EFFECT OF SENSOR INTELLIGENCE S. R. Ruocco, A. S. White and R. Gill Middlesex Polytechnic, UK	806
26.	A COMPUTER VISION SYSTEM USING A PHOTO-DIODE ARRAY PAN Baochang, ZHENG Shenglin, ZONG Haiyan, Volker Mueller Chongqing University, CHINA	331
27.	A MAGNETIC SCALE AND OPTICAL COLLIMATION SYSTEM FOR MEASURING LARGE SIZE HB Gong, BI Lianjun, WANG Jiyun Hebei Institute of Technology, CHINA	74
28.	AUTOMATIC CENTERING MEASUREMENT RESEARCH OF A LINE PROFILE QIANG Xueli (1), YANG Qing (2), CHAI Junyan (3) (1) Xi'an Automobile Fitting Works, CHINA (2) Northwestern University of Agriculture, CHINA (3) Weinan Research Institute of Agricultureral Machinery, CHINA	78
29.	RESEARCH OF AUTO-MEASURING STRAIGHTNESSTRI-PROBES ERROR-SEPARETING TECHNIQUE LIAO Nianzhao and HE Jie Chongging University CHINA	. 80

30.	THE MINIMIZATION METHOD OF THE POLAR DIFFERENCE FUNCTION FOR EVALUATION OF POSITION ERROR IN A HOLE SYSTEM XIE Tiebang Huazhong University of Science and Technology, CHINA	86
31.	AN ON-LINE WORKPIECE BORE SIZE MEASURING INSTRMENT WU Jun, LI Jun National University of Defence Technology, CHINA	88
32.	A NEW METHOD FOR IN SITU MEASUREMENT & COMPENSATING CYLINDRICITY IN ULTRA- PRECISION LATHE PAN Zhongming, LIU Xianbin National University of Defence Technology, CHINA	89
33.	THE EFFECT OF INSPECTION ERROR ON OPERATING CHARACTERISTYC FOR SAMPLING PLANS WU Wenchao Central Institute of Finance and Banking, CHINA	89
34.	MICROCOMPUTER BASED HIGH RESOLUTION GOLAY CODE CORRELATION SYSTEM FOR ULTRASONIC NON-DESTRUCTIVE TESTING  Z.X. Ding (1) and P.A. Payne University of Manchester Institute of Science and Technology, UK  (1) Institute of Semiconductors, Chinese Academy of Science, CHINA	90
35.	UNIFIED APPROACH FOR EVALUATION OF GEOMETRIC ERRORS FROM COORDINATE MEASUREMENTS M.S. Shunmugam Indian Institute of Technology, INDIA	98
36.	NONDESTRUCTIVE MEASUREMENT OF POWER BIPOLAR TRANSISTOR SAFE OPERATING AREA LIMITS S.G. BUZYKIN Moscow Power Engineering Institute, USSR	106
37.	A LASER REFLECTION METHOD FOR TRANSPARENT TUBE MEASUREMENT R.Jablonski Warsaw University of Technology, POLAND	109
38.	A NEW TECHNIQUE FOR MEASUREMENT AND MONITORING OF BEHAVIOR OF INDUCTION MOTOR (IST REPORT) Giichiro Ono, Takahiko Ono, Osamu Machara, Yoh Miyata ONO SOKKI CO., LTD., JAPAN	117
39.	AN ON-LINE MEASUREMENT METHOD OF CLOCKWORK GEARS WANG Wenyi; NA Xiaofeng Harbin Institute of Technology, CHINA	123
40.	STUDY ON AN OPTICAL GRATING INSTRUMENT FOR ON-LINE INTERNAL THREAD MEASUREMENT GAO Yianxin, WANG Wenyi, XUE Qiang, NA Xiaofeng Harbin Institute of Technology, CHINA	124
41.	THE RESEARCH FOR THE SYNTHETIC MEASURING METHOD OF BIG SIZE INTERNAL THREAD WANG Wenyi, GAO Yanxin, WU Shu, NA Xiaofeng Harbin Institute of Technology, CHINA	127
42.	THE RESEARCH ON A CONIC ERROR MEASURING METER BY DIGITAL DISPLAY AND THE ANALYSIS OF SYSTEM ERRORS JI Qingfa Jilin Institute of Technology, CHINA	128
43.	RESEARCH AND MAKING OF INTELLIGENT TWO FLANK GEAR ROLLING TESTER HAO Lanxiang, ZHANG Jian, FU Zhengming, HAN Guiqin Harbin University of Science & Technology, CHINA	133
44.	DISPLACEMENT MEASUREMENT WITH HOLOGRAPHIC INFORMATION PROCESSING HAN Zhaojin (1), CAO Yuhua (2), LI Fengjuan (3) (1), (2) East China Institute of Technology, CHINA	138

45.	RESEARCH ON DETERMINING KINEMATIC ACCURACY OF LATHE DRIVE CHAIN USING SINGLE-CHIP MICROCOMPUTER ZHU Qingbao Shandong Institute of Agricultural Mechanication, CHINA	143
46.	SPEEDING UP AUTOMATION OF MINIMUM ZONE METHOD FOR ROUNDNESS WITH ARTIFICIAL INTELLIGENCE HUANG Weiyuan Nanjing Municipal Part-time University of Technology, CHINA	148
17.	A NEW TECHNIQUE OF MEASURING FLATNESS ON PROCESS  GAO Chao (1), LI Jizheng (2)  (1) Harbin Electric Machinery Works, CHINA  (2) Jilin University of Technology, CHINA	148
18.	THREE-COORDINATE MEASUREMENT AND TWO-DIMENSIONAL SPECTRAL ESTIMATION OF THE GEAR TOOTH TURFACE ERRORS YU Honghua and WU Zhaotong Zhejiang University, CHINA	149
19.	TO EVALUATE THE CONTACT ACCURACY OF HELICAL GEAR ACCORDING TO ITS TOOTH FLANK ERROR YE Gang, WU Zhaotong Zhejiang University, CHINA	, 155
50.	MODELING AND EXPERIMENTAL INVESTIGATION OF POSITIONING ERROR CAEC IN SPACE GUO Zhongxiang and XU Xiangjun Shanghai Institute of Mechanical Engineering, CHINA	160
i1.	AUTOMATIC MEASURING AND DATA PROCESSING FOR MULTI-PARAMETER OF GEARS WITH LARGE DIAMETER JIAO Tiemin, KANG Shengjun Hebei Institute of Technology, CHINA	161
2.	THE QUANTITATIVE MEASUREMENT AND ANALYSIS OF THE ACCURACY FOR THE 891EM ELECTRONIC GEAR TESTING CENTER HE Xuetao (1), YU Shanjuan (2) (1) Beijing Institute of Chemical Technology, CHINA (2) Dalian University of Technology, CHINA	163
3.	AN IN-PROCESS MEASUREMENT AND QUALITY CONTROL SYSTEM FOR THE SIZE OF GROUND WORK-PIECES QU Xintian, DONG Shuxin (1), ZHANG Tiezhu, CHEN Xin (2) (1) Xi'an Jiaotong University, CHINA (2) Xi'an Vehicular Factory, CHINA	169
54.	DEVELOPMENT OF A RELIABLE SYSTEM FOR REMOTE ON-LINE SUPERVISION AND DIAGNOSIS LIU Bao, WAN Nianhong and QU Liangsheng Xi'an Jiaotong University, CHINA	170
55.	MICROCOMPUTER AIDED LEVEL MEASUREMENT SYSTEM WANG Li (1), WANG Yurong (2) (1) State-run Yuan Dong Machine Building Company, CHINA (2) Northwestern Polytechnical University, CHINA	175
56.	NCN-CONTACT AUTOMATICAL 3-D MEASUREMENT SYSTEM LUO Dali, WANG Hechen, HU Dan Chongqing University, CHINA	179
57.	DESIGN OF INDUCTANCE MICROMETER FOR PISTON CHECKOUT ZENG Falin, CHEN Zhixiang, MEI Ran, ZENG Youming, WU Songe Huazhong University of Science and Technology, CHINA	187
58.	TWO-DIMENSIONAL MEASURING MACHINE SYSTEM AND ITS ERROR REMEDY GUO Yunshan, ZHU Hanliang, LI Guangying (1), XI Hongzhuo (2) (1) Huazhong University of Science and Technology, CHINA (2) Hubei Institute of Technology, CHINA	192
59.	DEVELOPING OF THE MICRO-APERTURE LASER MEASURING INSTRUMENT LU Haibao, QI Xinmin, LI Ying National University of Defense Technology CHINA	197

60.	THE ESTABLISHMENT AND DISCUSSION OF THE FORMULA FOR CALCULATION OF AFFECTIVE DIAMETER COMPENSATION VALUE OF FLANKANGLE AND PITCH BRROR OF ISO METRIC SCREW THREADS WANG Shili, WANG Xiaochun National University of Defence Technology, CHINA	203
61.	PRECISE AUTOMATIC MEASUREMENT OF SPECTRAL LINE DISTANCE LIU Jun, TAN Xiangci, DU Wuyang (1) HUANG Bojian, ZHOU Shuwen (2) (1) Hubei Institute of Metrology and Measurement, CHINA (2) Huazhong University of Science and Technology, CHINA	204
62.	REAL-TIME MEASUREMENT OF OBJECT TRANSLATION BY ELECTRONIC SPECKLE USING AN OPTICAL FIBER ZHANG Jian, WU Liying (1), WU Peiji (2) (1) Harbin University of Science & Technology, CHINA (2) The College of Harbin Bearing Manufactory, CHINA	209
63.	REAL-TIME MONITORING OF TOOL WEAR BY THE RELATIVE CUTTING FORCE RATIO METHOD LI Xisoqian, LU Bingheng and GU Chongxian Xi'an Jiaotong University, CHINA	211
64.	A NEW METHOD FOR MEASURING HELICOID WANG Shikai Shanxi Institute of Mechanical Engineering, CHINA	219
65.	DEVELOPMENT OF AN INTELLIGENT MODULAR FIXTURE SYSTEM FOR FLEXIBLE ROBOTIC ASSEMBLY K.C. Chan and B. Benhabib University of Toronto, CANADA	224
66.	THE COMPUTER TECHNIQUE FOR THE PLOTTING BODE DIAGRAM OF AUTOMATIC CONTROL SYSTEMS AT THE BASE OF FAST FOURIER TRANSFORM V.N.Dantchenko Moscow Aviation Institute, USSR	231
67.	RESEARCH ON COMPUTER AIDED WORK-SETTING SYSTEMS Hengzheng LU, Takashi MIYOSHI, Katumasa SAITO Hokkaido University, JAPAN	234
68.	A METHOD CONCERNING THE SUBSTITUTION OF THE MEASUREMENT OF NIGHT VIEWING SYSTEM IN LABORATORY FOR THE DETECTING DISTANCE AND ITS IMPROVING CONCEIVABILITY CHEN Qingyou Wuxi Huguang Instrument Factory, CHINA	<sup>-</sup> 240
69.	A SYSTEM TO MEASURE COMPREHENSIVE PERFORMANCE OF ROBOTS ZHAI Yujian and MENG Zhengda Southeast University, CHINA	241
70.	IMAGE MEASUREMENT AND ACCURACY CALIBRATION 2HOU Manli, LI Bin, ZHU Ysoting, LI Hongzheng, ZHANG Zaochum, GE Hongwei Huazhong University of Science and Technology, CHINA	250
71.	AN ON-LINE HIGH SPEED INTELLIGENT TEST SYSTEM WITH IEEE-488 INTERFACE BUS LIU Leshan Huazhong University of Science and Technology, CHINA	257
72.	ON-LINE RECOGNIZING MAIN DESIGN PARAMETERS OF THE MAGNETIC HEAD ACCESS SYSTEM PEI Xiandeng, ZHAO Yonglong Huazhong University of Science and Technology, CHINA	260
	Session B	
73.	OPTICAL POWERED SENSORS FOR EMI-IMMUNE FACTORY AND AVIATION SENSING SYSTEM PAUL BJORK Honeywell Inc., USA	805
74.	OPTICAL FIBER SENSOR FOR MEASURING DISPLACEMENT AND VIBRATION XIE Tuqiang and DENG Xingzhong Huazhong University of Science and Technology, CHINA	182

		$\cdot$	
	75.	THE RESEARCH OF FIBER TRANSMISSION MEASURING METHOD OF THE TEMPERATURE IN THE GAS-MAKING FURNACE DENG Xingzhong, CHEN Xianping, LI Shenhao, WANG Hong Huazhong University of Science and Technology, CHINA	511
	76.	OPTICAL FLANK WEAR MONITORING OF CUTTING TOOLS BY IMAGE PROCESSING J.U. JEON and S.W. KIM Korea Advanced Institute of Science and Technology, KOREA	270 .
	77.	A THEORETICAL AND EXPERIMENT STUDY ON OPTICAL FIBER TEMPERATURE SENSOR LIU Bo and DENG Xingzhong Huazhong University of Science and Technology, CHINA	495
÷	78.	STUDIES OF BLOOD OXYGEN DETERMINATION USING OPTIC FIBER WANG Chihcheng Tongji Medical University, CHINA	816
	79.	DEVELOPMENT OF AN ECG TEST UNIT M. Kemal KIYMIK and Indan GÜLER Broiyes University of Kayseri, TURKEY	276
	80.	THE VIBRATION STABILITY ANALYSIS AND DESIGN OF THE VIBRATING CYLINDER OF CYLINDER PRESSURE TRANSDUCERS WANG Pizeng, JI Shuhai, JIANG Xiuzhen, FU Jiying (1), XU Zhenting, LIU Lijuen (2) (1) Harbin Institute of Technology, CHINA (2) Shenyang Institute of Instrumentation Technology, CHINA	281
	81.	COHERENT DOMAIN OF SIGNALS IN MACHINE TOOL DIAGNOSTIC BASED ON SURFACE ROUGHNESS SPECTRAL ANALYSIS AND ANALYSIS AND ANALYSIS TECHNICAL UNIVERSITY OF GOMESK, POLAND	774
		RESEARCH ON A NEW TYPE OF AIR-DRIVEN MULTI-FUNCTIONAL MEASURING DEVICE JI Qingfa (1), LI Jizhen (2) (1) Jilin Institute of Technology, CHINA (2) Jilin University of Technology, CHINA	286
	83.	THE DEVELOPMENT OF THE SPIKE SPRING MEASURING INSTRUMENT CONTROLLED BY MICROCOMPUTER ZHANG Jiwei, KIAO Guoxian, ZHANG Kuiwei; ZHANG Yu and JIANG Cheng Northeast University of Technology, CHINA	291
	84.	ANALYSIS OF SIGHTING ACCURACY IN A NEW TYPE OF NON-CONTACT MEASUREMENT SENSOR XU Jiahua, CHEN Jie, QUAN Wei Hefei Polytechnical University, CHINA	292
٠	85.	MICROWAVE ON-LINE MOISTURE CONTENT MONITORING IN PULVERIZED ORGANIC MATERIALS WAN Baofei Southeast University, CHINA	292
	86.	THE MICHELSON INTERFEROMETER AS A TEST BED FOR SMART SENSORS R. M. Serbyn National Institute of standards and Technology (formerly National Bureau of Standards), USA	812
	87.	DESIGN OF A HIGH ACCURACY, INTELLIGENT SHAFT-ANGLE ENCODER CHEN Qingwei, XU Jinliang, HU Weili and QIAN Yaoxing East China Institute of Technology, CHINA	293
	88.	THE MEASUREMENT FOR THE ACCURACY OF POSITIONING TRANSDUCERS LIU Jigou, DUANMU Shixia Shanghai Institute of Mechanical Engineering, CHINA	297
	89.	A FAN-SHAPED BEAM ULTRASONIC TRANSDUCKR H. Gai, Y. C. Li, A. Plaskowski, M. S. Beck University of Manchester, UK	788
	90.	A NOVEL ON-LINE PROGRAM OF INDUCTION DISPLACEMENT TRANSDUCER AND MICROCOMPUTER LI Xulai	298

.

91.	USING CAPACITANCE-GRID-SCAN TRANSDUCERS TIAN Dazi	302
	Hebei Institute of Technology, CHINA	
92.	PRESSURE SENSOR WITH LOW TEMPERATURE COEFFICIENT CHENG Xianan, CHEN Bingyu, WANG Xuwei, GU Qihua, LIU Kun Beijing University of Aeronautics, CHINA	303
93.	THE THERAPBUTIC PRINCIPLE AND CLINICAL APPLICATION OF THE STIMULATOR FOR DREDGING HUMAN BODY'S CHANNELS  XIA Chongjiang, LIN Jiarui (1), GAO Changzhen, JIANG Hanhua, HUANG Tieqiao (2), LI Nanyuan, KANG Ming (3), ZHU Fansan (4) (1), (3) Huazhong University of Science and Technology, CHINA (2) The Fourth Hospital of Wuhan, CHINA (4) Wuhan Yan'an Medical Apparatus & Instrument Factory, CHINA	303
94.	A DERIVED METHOD OF MAGNETOSTRICTION TRANSDUCER THEORETICAL FORMULA SHAN Chengxiang (1), NIU Yanwen (1), WANG Yingjie (2) (1) NortHeast Heavy Machinery Institute, CHINA (2) Fulaerji TV.; CHINA	304
95.	STUDY OF MAGNETIC GRID MEASURING SYSTEM CAI Jinda, DUANMUO Shixia Shanghai Institute of Mechanical Engineering, CHINA	304
96.	A STUDY ON THE ROTATION-FREE OPTICAL POSITION SENSOR J.H.Oh, W.S.Che and S.W.Park Korea Advanced Institute of Science and Technology, KORBA	813
97.	DIGITAL DYNAMIC COMPENSATION OF SENSORS AND ACTUATORS Y. Wu (1), J. E. Brignell (2) and S. S. Shahi (3) (1) Tianjin University, CHINA (2) University of Southampton, UK	819
98.	AN EVOLUTIONARY APPROACH TO INTELLIGENT TRANSDUCER SYSTEMS J. E. Brignell University of Southampton, UK	820
99.	THE DESIGN AND STUDY OF A PLASTIC FIBER-OPTIC SENSOR WITH THREE USES XU Zengpu (1), GU Chongxian (2) (1) Tianjin Institute of Light Industry, CHINA (2) Xi'an Jiaotong University, CHINA	305
100.	MICROCOMPUTER-BASED DISPLACEMENT MEASURING SYSTEM WITH INCREMENTAL ROTARY ENCODER WANG Daging, HUANG Shanglian Chongqing University, CHINA	310
101.	SIGNAL QUALITY OF RADIAL GRATING PAIR OF INCREMENTAL ROTARY ENCODER WANG Daging, HUANG Shanglian Chongqing University, CHINA	313
102.	A PROGRAMMABLE HIGH-RESOLUTION FREQUENCY SYNTHESIZER SONG Junshou, HUANG Renyuan, CAO Rai, YIN Huashan Chongqing University, CHINA	318
103.	A NEW TYPE OF HIGH ACCURACY DISPLACEMENT MEASUREMENT SYSTEM WITH MULTIFUNCTION AND MULTIDIMENSION XU Du and HUANG Sanglian Chongqing University, CHINA	322
104.	THE MINIMUM ZONE CHECKING FOR FORM AND POSITION ERRORS BASED ON THE LEAST SQUARE METHOD YANG Haifeng Beijing Data Processing Technology Research Institute, CHINA	322
105.	DIVIDING ERROR ANALYSIS AND ERROR ERASING PRINCIPLE OF METROLOGICAL RADIAL GRATING YU Hongli Chongqing University, CHINA	323
	vii ,	
	·	

106.	ECCENTRIC ADJUSTMENT ERROR ANALYSIS IN THE DIVISION OF METROLOGICAL RADIAL GRATING YU Hongli Chongqing University, CHINA	327
107.	MICROCOMPUTERIZING ROTATING COIL MAGNETOMETER WANG Defang (1), XU Yan (2), ZHU Minjun (3) and ZHU Hanliang (4) Huazhong University of Science and Technology, CHINA	336
108.	NULL POSITION AND ITS CHARACTERS STUDY FOR A DIAPHRAGM TYPE PRESSURE DETECTOR  XU Ruixing, JIN Liuyi, LI Liangmou and HE Langxian Huazhong University of Science and Technology, CHINA	339
109.	THE DEVELOPMENT OF A NEW COTTON QUALITY MEASURING INSTRUMENT WU Zeming, LI Zhu, LI Guangying, CAO Wei and XIE Tiebang Huazhong University of Science and Technology, CHINA	339
110.	A NEW METHOD FOR CHECKING THE DEGREE OF BEAM COLLIMATION THE ROTATING GRATING METHOD CHEN Zhiqing, LIAO Zhaoshu, LU Rushu and TAO Jingguang Huazhong University of Science and Technology, CHINA	340
1117	AUTOMATIC MEASUREMENT FOR HIGH ACCURATE LINEAR INDUCTOSYN AND ITS DIGITAL DISPLAY METER GE Qiang, ZHOU Qiang "Lucei Institute of Metrology and Measurement, CHINA	344
112.	INTELLIGENT DISPLACEMENT DISPLAY MEASURE AND CONTROL SYSTEM ZHOU Rongxian and GAO Zhengzhong Wuhan Digital Engineering Institute, CSSC., CHINA	347
113.	DYNAMIC MEASUREMENT OF FLYING HEIGHT OF MAGNETIC HEAD WITH HEAD ITSELF AS TRANSDUCER LIU Bo Huazhong University of Science and Technology, CHINA	351
114.	MEASUREMENT OF DISPERSION AND ATTENUATION CHARACTERISTICS OF MULTI-CORE FIBERS  Z. Yilbas, B. S. Yilbas, N. F. Guler, S. Özsoy Breiyes Universitesi, TURKEY	810
115.	THEORETICAL ANALYSIS ON THE LOSSES DUE TO PERIODIC MICROBEND IN A PARABOLIC INDEX FIBER CAO Wei, DENG Xinzhong and LI Shenghao Huazhong University of Science and Technology, CHINA	354
116.	LASER RANGEFINDER FOR VISIBLE OBJECTS MEASUREMENT WANG Yangsheng (1) SHI Hanmin (1) YANG Shuzi (1) BOB Beattie (2) (1) Huazhong University of Science and Technology, CHINA (2) Meta Machines Ltd, U.K.	359
117.	AN INTELLIGENT TRANSIENT RECORDER WANG Yixing and LIN Xiaojiang Eastern China Institute of Technology, CHINA	366
118.	THREE- WAVELENGTH RADIATION PYROMETRY LI Xiaodong (1), QIN Yonglie (2) (1) East China University of Chemical Technology, CHINA (2) Shanghai Institute of Mechanical Engineering, CHINA	371
119.	LASER-COMPUTRIZATION INSTRUMENT FOR HOLE-CENTER-DISTANCE MEASURING IN CHAIN PLATES LU Zhoutang . Zhejiang Institute of Technology, CHINA	375
120.	A HIGH ACCURACY MEASUREMENT METHOD OF THE LATHE STRAIGHT MOTION ERROR OF SPACE TRACK LIU Zhongsheng (1), GAO Chao (2), XU Jianmin (3) (1), (2) Jilin University of Technology, CHINA (3) Harbin Electic Machinery Works, CHINA	375
121.	DUAL SIX-PORT AUTOMATIC NETWORK ANALYZER IN DIELECTRIC WAVEGUIDE AT 8MM BAND	376

	XU Deming, SHEN Ying (1), LIU Bing (2) (1) Shanghai University of Science and Technology, CHINA (2) College of Engineering, Shanghai University, CHINA	
122.	MULTI-FUNCTION MULTI-CHANNEL TEMPERATURE TESTER HU Xuxiao, CHEN Zichen, CHEN Zhaonian, GAO Chenyu, TONG Zhongfang Zhejiang University, CHINA	381
123.	AN INTELLIGENT MEASUREMENT SYSTEM FOR THE AXIAL PROFILES OF WIRE DRAWING DIE WANG Yanfang, CHEN Gongjian, ZHU Zuohang and ZHENG Youqin	386
124.	Shanghai Institute of Mechanical Engineering, CHINA  THE PRIMARY DISCUSSION ON SYSTEM DESIGN OF THE INTELLIGENT MEASUREMENT INSTRUMENTS FOR INDUSTRY CHEN Jiqi Nanjing Institute of Chemical Technology, CHINA	390
125.	A STUDY FOR DIGITAL FORCE BALANCE MEASURING DEVICE LI Changxi, YUAN Long Huazhong University of Science and Technology, CHINA	. 390
126.	MULTI-PARAMETRIC APERTOMETER WITH OPTICAL FIBER INTESITY MODULATION WANG Jue, QI Guangxue University of Yanshan, CHINA	391
127.	THE SUPPLEMENT METHOD FOR RENOVATION OF INTERNATIONAL METHOD OF LEAST SQUARE CIRCLE HUANG Weigingan	391
128.	Nanjing Municipal Part-time University of Technology, CHINA  AN ON-LINE THICKNESS INTELLIGENT MEASURING INSTRUMENT FOR THE FLOATING PROCESS FLAT GLASS LI Dongsheng, DONG Shuxin and ZHU Fengpan Xi'an Jiaotong University, CHINA	392
129.	A DIGITAL AND INTELLIGENT MICROMETER  XU Zhenggao, YANG Shunian  Huazhong University of Science and Technology, CHINA	400
130.	INTELLIGENT INFRARED TV MICROSCOPIC AND MICROMETRIC INSTRUMENT WANG Zhaoyang (1), GUO Dizhong (2) (1) Wuhan University of Technology, CHINA (2) Huazhong University of Science and Technology, CHINA	406
13Ļ.	THE RESEARCH AND DESIGN FOR DIGITAL DISPLAY COMPARATOR WITH HOLOGRAPHIC DIFFRACTION GRATING XIE Tiebang Huazhong University of Science and Technology, CHINA	409
Sess	ion C	
132.	RESEARCH AND DEVELOPMENT IN DIMENSIONAL METROLOGY-CSIRO DIVISION OF APPLIED-NATIONAL MEASUREMENT LABORATORY  B.G. Thwaite National Measurement Laboratory, AUSTRALIA	763
133.	FORCE FIELD SENSING Shawn Buckley Cochlea Corp, USA	792
134.	SOLIDS VELOCITY AND MASS FLOW MEASUREMENTS USING ELECTRODYNAMIC TRANSDUCERS AND CROSS CORRELATION TECHNIQUES C.G. Xie (1), A.L. Stott (1), X.R. Fan (2) and M.S. Beck (1) (1) Dept. of Instrumentation & Analytical Science, UMIST, Manchester, UK (2) Huazhong University of Science and Technology, CHINA	418
135.	AUTOMATIC TEST OF DYNAMIC CHARACTERISTIC OF MICRO-MECHANICAL SWITCHES ZHU Peiguo, JIANG Xiuzhen, CHEN Wenxian (1), TANG Jisheng (2) (1) Harbin Institute of Technology, CHINA (2) Qingdao General Refrigerator Factory, CHINA	421

136.	MICROPROCESSOR BELT CONVEYOR SCALE WITH WIDE TEMPERATURE RANGE CHE Rensheng, CHEN Lisheng, WANG Wenyi Harbin Institute of Technology, CHINA
1 \$7 .	TOOL CONDITION MONITORING USING DYNAMIC FORCE MEASUREMENTS L.C. Lee, K.H.W. Seah and K.S. Lee National University of Singapore, SINGAPORE
138.	AN INTELLIGENT, AUTORANGING ELECTROMETER S. K. Howell and T. D. S. Hamilton Manchester University, UK
139.	A SYSTEM OF AUTONOMOUS, INTELLIGENT VOLTAGE SUPPLIES BASED ON A AERIAL BUS S. K. Howell and T. D. S. Hamilton Manchester University, UK
140.	INVESTIGATION OF FLOW BEHAVIOUR WITHIN A HEART-ASSIST DEVICE USING A LASER DOPPLER ANEMOMETER WU Jin, Carola Konig, and Colin Clark Brunel University, Uxbridge, UK
141.	STUDY OF MEASURING THE PHASES OF DYNAMIC PHYSICAL QUANTITY SIGNALS IN THE PRODUCTION ENGINEERING ZHENG Detao, YU Junyi and QIAO Simao Jilin University of Technology, CHINA
142.	THE IN-PROCESS MEASUREMENT OF GRINDING WHEEL UNBALANCE AND THE STUDY OF ITS MICROCOMPUTER CONTROL SYSTEM JI Qingfa and MU Deqiang Jilin Institute of Technology, CHINA
143.	ONE METHOD TO RAPID RECOGNITION OF OBJECT WU Liying Harbin University of Science & Technology, CHINA
144.	THE CALCULATING COMPENSATION OF DYNAMIC ERROR IN FORCE MEASURING SYSTEM JIANG Zuomin, CUI Yongchun, SUN Heyi Harbin Institute of Technology, CHINA
145.	THE DATA COLLECTING AND PROCESSING SYSTEM OF MULTIPLE PHYSICAL QUANTITIES BY A Z-80II COMPUTER HE Min Huazhong University of Science and Technology, CHINA
146.	THE PRINCIPLES OF SUPER-DYNAMIC STRAIN AMPLIFIER AND ITS APPLICATIONS GUO Jianguo, CUI Dongming East China Institute of Technology, CHINA
147.	OPTICAL COUNT OF THE MEASURING SYSTEM ON THE BASIS OF CRITICAL ANGLE FOCUSING METHOD CAI Dunhe China Institute of Metrology, CHINA
148.	METHODS FOR MEASUREMENT OF PHOTOSENSITIVITY OF A-SI PHOTODIODE WU Dachuai, PANG Rong, CHENG Zhiqiang and HUI Senxing Shanghai Institute of Ceramics, Academia Sinica, CHINA
149.	MBASUREMENT OF REFLECTIVITY IN XUV AND VUV SPECTRAL RANGE ZHUANG Dakui, YANG Tianli Shanghai Institute of Optics and Fine Mechanics, CHINA
150.	A MEASUREMENT TECHNIQUE OF HIGH LOSS DIELECTRIC MATERIALS USING AUTOMATIC SIX-PORT REFLECTOMETER AT MM BAND NIU Maode, SHEN Ying Shanghai University of Science and Technology, CHINA
151.	AN ON-LINE MEASUREMENT OF ELECTRONIC DEVICE AND COMPUTER-AIDED CIRCUITE ANALYSIS HU Dankang Shanghai Light Industry Research Institute, CHINA
152.	THE PROGRAM DESIGN AND DATA PROCESSING OF INTELLIGENT INDUCTION MEASURING APPARATUS WITH MULTIPLE HEAD (TYPE WS16)

	LI Xulai Beijing Municipal Cleaning Machine Works, CHINA	
153.	LASER BASED LIGHT SCATTERING TECHNIQUE FOR PARTICLE SIZING WANG Naining and YU Kianhuang Shanghai Institute of Mechanical Engineering, CHINA	462
154.	UTILIZING DIGITAL FILTERS TO IMPROVE THE DYNAMIC PRECISION OF TEMPERATURE MEASUREMENT SYSTEM WITH THERMOCOUPLES QI Guangxue and WU Siliang Yanshan University, CHINA	463
155.	AN INTELLIGENT ULTRASONIC FLOWMETER FOR THE GAS INDUSTRY CHEN Shuxi Institute of Intelligent Machines, Academia Sinica, CHINA	464
156.	MICROCOMPUTER-BASED TENSILE TESTING SYSTEM AN Zhenzhuang Tianjing University, CHINA	465
157.	MEASUREMENT OF RELATIVE CHANGE OF LINEAR THERMAL EXPANSION COEFFICIENT UNDER NO STRESS CHENG Xianan (1), YAO Cishun (2) (1) Beijing University of Aeronautics and Astronautics, CHINA (2) North China University of Technology, CHINA	471
1,58.	A DIGITAL VOLTMETER STANDARD SYSTEM AND VALUE TRANSFERRING FENG Zhanling, ZHANG Chundi, QIE Jiaping National Institute of Metrology, CHINA	475
159.	A NEW SCHEME OF THE WATER CONTENT METER JIANG Benhe, WU Jiyou (1), DU Shengjun (2) (1) Shandong, University, CHINA (2) The College of Shandong Architectural Engineering, CHINA	475
160.	THE AUTOMATIC MEASUREMENT SYSTEM OF INTEGRATED-FILM-RESISTOR PARAMETER ZENG Nan, SHI Ren and YAO Yannan Xi'an Jiaotong University, CHINA	476
161.	A TWO-LEVER MASTER-SLAVE MICROCOMPUTER SYSTEM USED IN THE DYNAMICAL MEASUREMENT OF THE SIZE AND DISTRIBUTION OF ATOMIZED PARTICLES WITH LASER JIANG Feng, YANG Guanling Chongqing University, CHINA	477
162.	THE INTRODUCTION OF A METHOD FOR LEAST-SQUARES PROCEDURE A COMMENT ON THE INTERNATIONAL POPULAR ALGORITHM JIANG Benhao, ZHANG Yulin ,LU Xingsheng Nanjing Forestry University, CHINA	477
163.	A NEW INSTRUMENT FOR MEASURING LIGHT ENERGY QUANTITY FIELD OF SMALL SAMPLE HE Zhenjiang, YE Zhonghui, HE Yinfei Chongqing University, CHINA	478
164.	BUILDING ENERGY MEASUREMENT AND CONTROL BY PERSONAL COMPUTERS L.F. Jesch and L. Jankovic University of Birmingham, UK	767
165.	RESEARCH ON REAL-TIME MEASUREMENT OF SIZE AND DISTRIBUTION OF ATOMIZED PARTICLES IN HIGH SPEED CENTRIFUGAL ATOMIZED FIELD The Particle Measuring Research Group Chongqing University, CHINA	481
166.	THE MULTI-RING FIBER SENSOR USED IN MEASURING THE SIZE AND DISTRIBUTION OF PARTICLES SHEN Chubing, HE Zhengjiang Chongqing University, CHINA	485
167.	SIGNAL DETECTION AND ITS INTELLIGENT PROCESSING BAI Jianguo and JIAN De Sichuan Institute of Light Industry and Chemical Technology, CHINA	489
168.	THE METHOD OF IMPROVING THE MEASUREMENT ACCURACY OF DYNAMIC TEMPERATURE TONG Min, YE Hunian, LI Zhu and MAO Yuchong Huazhong University of Science and Technology, CHINA	491

169.	A HIGH-SENSITIVITY OPTICAL SIGNAL METER WITH INTELLIGENCE LI Ming, DENG Xingzhong, XIE Tuqiang and WU Zeming Huazhong University of Science and Technology, CHINA	498
170.	THE INITIAL STUDY OF OPTICAL FIBER USED TO TAKE SURFACE FEATURES REFLECTION SPECTRUM AND RADIATION SPECTRUM OF LIGHT SOURCE  (I) YE Hunian, (2) XU Zhenyuan  (1) Huazhorg University of Science and Technology, CHINA  (2) The Academy of Sciences of China, CHINA	501
171.	SIGNAL PROCESSING OF THE FIBER-OPTIC PYROMETER CHENG Xianping, DENG Xingzhong, CAO Wei and ZHU Shun Huazhong University of Science and Technology, CHINA	506
172.	MEASUREMENT OF REACTION RATES OF BaTiO, AND PbTiO, HU Jinyuan Huazhong University of Science and Technology, CHINA	513
173.	A NEW PROGRAM COMPENSATION METHOD OF DYNAMIC ERRORS OF DYNAMOMETER HE Diqiu, LI Shuzhen, YANG Kuguang Huazhong University of Science and Technology, CHINA	515
174.	MEASURING 1 um DIAMETER GAUSSIAN BEAMS USING A HOLOGRAPHIC GRATING WU Zhen Huazhong University of Science and Technology, CHINA	520
175.	MEASUREMENT AND INTEGRATED CONTROL OF GAS CARBURIZING HUANG Yuehuai, XU Wuliang and MU Leming Huazhong University of Science and Technology, CHINA	524
176.	A NaOH CONCENTRATION ON-LINE MEASUREMENT DEVICE REN Shiyan Huazhong University of Science and Technology, CHINA	528
177.	NEW METHOD ACQUIRING MICROSCOPIC INFORMATION OF MATERIALSPOSITRON ANNIHILATION TECHNIQUE TANG Chaoqun Huazhong University of Science and Technology, CHINA	532
178.	A SINGLE-CHIP-MICROCOMPUTER BASED VIBRATION METER ZHOU Shumei, MAO Qianmin Huazhong University of Science and Technology, CHINA	536
179.	RESEARCH ON MEASURING THE TRANSIENT TEMPERATURE IN DIESEL ENGINE UNDER COLD-STARTING CONDITIONS CHEN Xu Huazhong University of Science and Technology, CHINA	540
180.	THE MEASUREMENT OF COMPOSITION DISTRIBUTION AND CATALYSIS ACTIVITY FOR THE MULTICOMPONENT OXIDE CATALYST WANG Hailong, QIAN Xiaoliang, ZHANG Fungliang, CAO Shuyun Huazhong University of Science and Technology, CHINA	545
181.	RESEACH ON MEASUREMENT AND COMPENSATION OF THE RADIAL MOTION ERROR IN A HYDROSTATIC BEARING BORING BAR PAN Zhongmin, HUANG Xiaoxi, WANG Haofan National University of Defence Technology, CHINA	549
182	EFFECTIVE AREA OF THE RAM-CYLINDER SYSTEM WITH SEAL GROOVE WANG Dachong Hubei Institute of Metrology, CHINA	553
183	A NEW INSTRUMENT TO MEASURE HAMMER ENERGY OF COUNTERBLOW HAMMER ZHOU Guohong, HE Jintian, SU Qichu Zhengzhou University, CHINA	556
184	A MICROCOMPUTER-BASED SYSTEM FOR DETECTION AND PROCESS OF QRS EVENT SERIES LUO Shuqian Zhengzhou University, CHINA	559
185	COAL IGNITION POINT MEASUREMENT BY MICROCOMPUTERS LIU Kaipei, CHEN Shiliang	562

186.	AN ON-LINE MEASURING SYSTEM USING MICRO-COMPUTER FOR THE ELECTRICAL PARAMETERS OF LARGE FERRO-ALLOY FURNACE LI Qiyen, HU Shichuang and YE Misoyuan Huazhong University of Science and Technology, CHINA	567
187.	A STUDY OF THE CALIBRATION PROPERTIES OF COPPER-IRON DILUTE MAGNETIC ALLOYS LOW-TEMPERATURE (4-273)K THERMOCOUPLE WANG Huiling (1), GAO Hongchun (2) (1) Huazhong University of Science and Technology, CHINA (2) Academy of Metrology of China, CHINA	57!
188.	PRECISION MEASUREMENT OF THE QUANTUM HALL RESISTANCE YE Misoyuan, LIU Jingxiang, ZHANG Yan (1), MENG Qinghui and LI Bing (2) (1) Huszhong University of Science and Technology, CHINA (2) The Academy of Sciences of China, CHINA	576
189.	A NEW METHOD FOR PRECISELY DETERMINING GRAVITATIONAL CONSTANT G CHEN Yingtian, LUO Jun, ZHANG Xuerong and LI Jianguo Huazhong University of Science and Technology, CHINA	579
190.	APPLICATION OF THE MULTIPLE INPUT FREQUENCY DOMAIN MODEL FOR NOISE IDENTIFICATION 2HOU Jingxuan Huázhong University of Science and Technology, CHINA	583
191.	COMMUNICATION NETWORKS IN DISTRIBUTED INSTRUMENT SYSTEMS JIN Wu & Christopher Hudson Brunel University, ENGLAND	599
192.	ANALYSIS OF CYIINDRICAL SURFACES FOR AUTOMATIC DIAGNOSIS OF MANUFACTURING ERRORS  A. Del Taglia and M. Vignale Universita' di Firenze, ITALY	607
193.	12-LEAD BLECTROCARDIOGRAM ANALYSIS PROGRAM LUO Shuqian (1), W. J. Tompkins (2) (1) Zhengzhou University, CHINA (2) University of Wisconsin-Madison, USA	623
194.	ORBITAL FORMING ON THE ROCKING DIE PRESS IN FORGING MANUFACTURE J. Grzeskowiak Metal Forming Institute, POLAND	630
195.	A PRACTICAL SUBDIVIDING MOIRE FRINGES METHOD BASED ON MICROCOMPUTER WANG Wenyi, PU Zhaobang (1), XUE Qiang, LIN Jianlian (2) (1) Harbin Institute of Technology, CHINA (2) Measyring Centre of Wan Bao Electric Equipment Company, CHINA	639
196.	A FULL COMPUTERIZED COORDINATE DIGITAL DISPLAY AND DATA PROCESSING SYSTEM CHE Rensheng, CHEN Liyan, LIN Jianlian, MU Jingyue Harbin Institute of Technology, CHINA	641
197.	AN AUTO-GENERATION SYSTEM FOR TEST SOFTWARE USED IN COMPUTERISED INSTRUMENTS LI Zhaoquan and DU Lianshi Tongji University, CHINA	645
198.	APPLYING ADAPTIVE FILTERING TO REDUCE THE RANDOM ERRORS IN DYNAMIC MEASUREMENT WANG Kianyan (1), LIN Honghua (2) (1) China Quality Inspecting and Testing Centre of Hoisting and Conveying Machinery, CHINA (2) Beijing Institute of Technology, CHINA	646
199.	DATA PROCESSING METHOD OF UNIVERSAL MICRO-COMPUTER BASED INVOLUTE INSPECTING INSTRUMENT WITH RECTANGULAR COORDINATES LI Kulai Beijing Cleaning Machine Works, CHINA	648
200.	ON THE RESEARCH OF A NEW INTELLIGENT MEASURING INSTRUMENT FOR GEOMETRICAL QUANTITIES ZHU Qingbao Shandong Institute of Agricultural Mechanizition, CHINA	648
	xiii	•

201.	A NEW METHOD FOR DISCRIMINATING PARASITIC ERRORS LUO Shizhi Beijing Union University, CHINA	649
202.	A NEW METHOD FOR CHROMATOGRAM PATTERN PROCESSING LI Yuhong, LI Zhu, YE Hunian	650
	Huazhong University of Science and Technology, CHINA	
203.	THE MEASURING ACCURACY OF THE MULTISTEP METHOD IN THE ERROR SEPARATION TECHNIQUES CAO Lingxiang Northwest Polytechnical University, CHINA	654
204.	A STUDY ON THE FAULT TESTING AND DIAGNOSTIC SYSTEM FOR MICROCOMPUTER MODEL	
	TP-801 TANG Younghong, 2HOU Zude (1), ZHU Sichung (2) (1) Huazhong University of Science and Technology, CHINA (2) Hefei Polytechnic University, CHINA	661
205.	OPTIC-ELECTRICAL HYBRID AND AUTOMATIC PROCESS SYSTEM OF FRINGE PATTERNS YANG Yiming, TANG Liangjing Huazhong University of Science and Technology, CHINA	666
206.	ON INTELLIGENT SIGNAL PROCESSING YANG Shuzi, OUYANG Puren, ZHENG Xiaojun, DING Hong Huazhong University of Science and Technology, CHINA	668
207.	RANGE IMAGES FROM GRAY LEVEL IMAGES BY PARALLEL POWER SPECTRUM ANALYSIS OF THE SIGNALS FROM A DITHERED ARRAY OF PIXELS M. W. Siegel Carnegie Mellon University, USA	804
208.	3-DIMENSIONAL DIGITAL IMAGE COMPUTER PROCESSING MENG Kianghai Wuhan Technical University of Surveying and Mapping, CHINA	673
209.	COMPUTER IMAGE PROCESSING OF X-RAY BRONCHUS IMAGE DONG Gang and CAO Qingyuan Wuhan Technical University of Surveying and Mapping, CHINA	675
210.	RENOLDS NUMBER COMPENSATION IN FLOW MEASUREMENT USING ORIFICE METERS LI Yangqing, YU Jing No.10 Automation Instruments Plant of Tianjin, CHINA	797
Sess	ion D	•
211.	AN APPROACH TO THE EXPERT QUALITY SYSTEM BUILDING V. Milsõic, J. Stanic, V. Majstorovic Laboratory Production Metrology and Quality Assurance, YUGOSLAVIA	811
212.	SOME EXPERIENCES FROM TOOL INSPECTION, STANDARDIZATION AND PERIODICAL INSPECTION OF MEASURING EQUIPMENT Gunnar Briksson Metrology Standards Room, SWEDEN	589
213.	QUALITY CONTROL IN FMS Rambabu Kodali and S. S. N. Murty Indian Institute of Technology, INDIA	.617
214.	SPECTRAL ANALYSIS OF LOW FREQUENCY ERRORS ON GEARS BAI Yongxin, LIU Chao Shanxi Institute of Mechanical Engineering, CHINA	679
215.	RESEARCH ON SPECKLE SHEARING INTERFEROMETRY AND ITS APPLICATION IN THE ENGINEERING ZHANG Lihong, ZHANG Lizhong Wuhan University of Hydraulic and Electrical Engineering, CHINA	684
216.	REASEARCH ON THE RELIABILITY OF MEASUREMENT WANG Wenyi (1), LI Zhu, ZHU Hanliang (2) (1) Wuhan Institute of Technology, CHINA	688

217.	A NEW THREE-CLASSIFIED CONTROL CHART LIU Zhongsheng and XU Jinzhao Jinlin University of Technology, CHINA	692
218.	ZK-3 TYPE STATISTICAL QUALITY CONTROLLER AND ITS APPLICATION CHENG Jiabao, CHEN Zhixiang, LI Zhu (1), XI Hongzuo (2) (1) Huazhong University of Science and Technology, CHINA (2) Hubei Institute of Technology, CHINA	695
219.	A STUDY ON REAL TIME FORECASTING QUALITY CONTROL SYSTEM OF AN INTERNAL CENTRELESS GRINDING MACHINE CHEN Zhixiang, CHEN Zhongchun, LI Zuoqin, HU Changhua Huazhong University of Science and Technology, CHINA	699
220.	ON REAL TIME MODELING IN QUALITY CONTROL OF MANUFACTURING OPERATION CHEN Zhixiang, LI Zuoqing Huazhong University of Science and Technology, CHINA	706
221.	A STUDY FOR QUALITY REAL TIME FORECASTING CONTROL SYSTEM ON CENTERLESS INTERNAL RING GRINDING MACHINE (continued) LI Zuoqing, CHEN Zhixiang, CHEN Zhongchun Huazhong University of Science and Technology, CHINA	711
222.	DYNAMIC STATISTICAL CONTROL OF OPERATION CHEN Zhongohun (1), CHEN Zhixiang (2) (1) The Second Automobile Works, CHINA (2) Huazhong University of Science and Technology, CHINA	716
223.	ANALYSIS OF THE DYNAMIC CHRACTERISTIC OF A DYNAMIC PROBE GUO Xinbau, XU Jinxiang Tongji University, CHINA	716
224.	AN INTEGRATE MULTIVARIATE ANALYTICAL APPROACH TO DETERMINING THE PREFERRED SCOPE OF COMPANY STANDARDIZATION XU Xuelin Central-South Forestry College, CHINA	717
225.	AN INVESTIGATION ON A SIMULATED TEST METHOD OF HIGH TEMPERATURE SLIDING AND IMPACTING WEAR OF DIE MATERIALS SHI Zhanhua, XIAO Zhongyi, LI Xizhang, JIANG Xiaobo and WU Yiping Huazhong University of Science and Technology, CHINA	718
226.	THE APPLICATION OF POSITION LIFETIME MEASUREMENT TECHNIQUE TO THERMAL FATIGUE IN DIE STEEL LI Xizhang, SHI Zhanhua, WU Yiping and TAN Chaoqun Huazhong University of Science and Technology, CHINA	724
227.	DYNAMIC MEASURING OF SURFACE TEMPERATURE AND FRICTIONFACTOR IN SIMULATED THERMAL WEAR WU Yiping, SHI Zhanhua, ZHANG Yisheng and XIAO Zhongyi Huazhong University of Science and Technology, CHINA	729
228.	A PRELIMINARY STUDY ON SAFETY OF ACOUSTICS ENVIRONMENT OF LIPOTES VEXILLIPER WANG Ding, WANG Kexiong, LIU Renjum and CHEN Peixum (1) SHENG Gang, LU Wenxiang and YANG Shuzi (2) (1) Institute of Hydrobiology of Academia Sinica, CHINA (2) Huazhong University of Science and Technology, CHINA	735
229.	THE STUDY FOR DISTINGUISHING AIRBORNE MICROBE WITH PHOTOELECTRON TECHNOLOGY TANG Xuehua, YE Hunian, LI Zhu Huazhong University of Science and Technology, CHINA	736
230,	THE STUDY OF CHARACTERIZED PARAMETERS IN BRAINSTEM EVOKED RESPONSES FANG Lieyi, LIN Jiarui, ZHANG Jun (1), WU Zhanyuan (2) (1) Huazhong University of Science and Technology, CHINA (2) Rubei Medical College, CHINA	740
231.	A STUDY OF THE MEASUREMENT OF THE WORM WHEEL PROFILE ERROR MO Yusong, DING Mingliang, XU Jinhui	740

232.	DESIGN AND RESEARCH OF MICROPROCESSOR BASED AUDITORY STIMULATOR LIN Jiarui, FANG Lieyi (1), ZHU Fansan (2), WU Zhanyan (3) (1) Huazhong University of Science and Technology, CHINA (2) Wuhan Yan An Medical Apparatus & Instrument Factory, CHINA (3) Hubei Medical College, CHINA	<b>741</b>
233.	THE RESEARCH FOR THE INFORMATION OF ONCOMBLANIA SNAILS YE Hunian (1), LU Yunfang (2) (1) Huazhong University of Science and Technology, CHINA (2) The Academy of Medical Sciences of Hubei, CHINA	746
234.	MEASUREMENT OF MICROWAVE RADIATION OF HUMAN BODY AND ITS APPLICATIONS XIANG Xunxian, XU Liqun, ZHANG Yan (1), LI Dinjou (2) (1) Huazhong University of Science and Technology, CHINA (2) Henan Tumor Hospital, CHINA	750
235.	MEASUREMENTS AND COMPENSATORY CONTROL OF FINISH SURFACE IN TURNING PROCESS CHONG Won Lee and Eon Hwang Korea Advanced Institute of Science and Technology, KOREA	822
236.	A METHOD FOR FAST DATA SAMPLING OF THE INTERFERENCE PHASE AND UP-DOWN COUNTING THE CHANGE OF THE NUMBER OF THE ORDER OF INTERFERENCE FRINGES Fromund Hock Institute fuer Messtechnik im Maschinenbau, Universitaet Hannover Hannover, F. R. Germany	817
237	A LASER SCANNER FOR FAST MEASUREMENT OF 3-D PROFILE LINES FOR USE IN THE FORGING INDUSTRY Fromund Hock Institute fuer Messtechnik im Maschinenbau, Universitaet Hannover Hannover, F. R. Germany	818