

EBOOK FREE ADVANCED MATHEMATICAL AND COMPUTATIONAL TOOLS IN METROLOGY AND TESTING AMCTM VIII SERIES ON ADVANCES IN MATHEMATICS FOR APPLIED SCIENCES .PDF

THE MAIN THEME OF THE AMCTM 2008 CONFERENCE REINFORCED BY THE ESTABLISHMENT OF IMEKO TC21 WAS TO PROVIDE A CENTRAL OPPORTUNITY FOR THE METROLOGY AND TESTING COMMUNITY WORLDWIDE TO ENGAGE WITH APPLIED MATHEMATICIANS STATISTICIANS AND SOFTWARE ENGINEERS WORKING IN THE RELEVANT FIELDS THIS REVIEW VOLUME CONSISTS OF REVIEWED PAPERS PREPARED ON THE BASIS OF THE ORAL AND POSTER PRESENTATIONS OF THE CONFERENCE PARTICIPANTS IT COVERS ALL THE GENERAL MATTERS OF ADVANCED STATISTICAL MODELING E G UNCERTAINTY EVALUATION EXPERIMENTAL DESIGN OPTIMIZATION DATA ANALYSIS AND APPLICATIONS MULTIPLE MEASURANDS CORRELATION ETC METROLOGY SOFTWARE E G ENGINEERING ASPECTS REQUIREMENTS OR SPECIFICATION RISK ASSESSMENT SOFTWARE DEVELOPMENT SOFTWARE EXAMINATION SOFTWARE TOOLS FOR DATA ANALYSIS VISUALIZATION EXPERIMENT CONTROL BEST PRACTICE STANDARDS ETC NUMERICAL METHODS E G NUMERICAL DATA ANALYSIS NUMERICAL SIMULATIONS INVERSE PROBLEMS UNCERTAINTY EVALUATION OF NUMERICAL ALGORITHMS APPLICATIONS ETC AND DATA FUSION TECHNIQUES AND DESIGN AND ANALYSIS OF INTER LABORATORY COMPARISONS THIS VOLUME CONTAINS ORIGINAL AND REFEREED CONTRIBUTIONS FROM THE TENTH AMCTM CONFERENCE NVIIM RU AMCTM2014 HELD IN ST PETERSBURG RUSSIA IN SEPTEMBER 2014 ON THE THEME OF ADVANCED MATHEMATICAL AND COMPUTATIONAL TOOLS IN METROLOGY AND TESTING THE THEMES IN THIS VOLUME REFLECT THE IMPORTANCE OF THE MATHEMATICAL STATISTICAL AND NUMERICAL TOOLS AND TECHNIQUES IN METROLOGY AND TESTING AND ALSO KEEPING THE CHALLENGE PROMOTED BY THE METRE CONVENTION TO ACCESS A MUTUAL RECOGNITION FOR THE MEASUREMENT STANDARDS CONTENTS FOSTERING DIVERSITY OF THOUGHT IN MEASUREMENT SCIENCE F PAVESE AND P DE BI[?] VRE POLYNOMIAL CALIBRATION FUNCTIONS REVISITED NUMERICAL AND STATISTICAL ISSUES M G COX AND P HARRIS EMPIRICAL FUNCTIONS WITH PRE ASSIGNED CORRELATION BEHAVIOUR A B FORBES MODELS AND METHODS OF DYNAMIC MEASUREMENTS RESULTS PRESENTED BY ST PETERSBURG METROLOGISTS V A GRANOVSKII INTERVAL COMPUTATIONS AND INTERVAL RELATED STATISTICAL TECHNIQUES ESTIMATING UNCERTAINTY OF THE RESULTS OF DATA PROCESSING AND INDIRECT MEASUREMENTS V YA KREINOVICH CLASSIFICATION MODELING AND QUANTIFICATION OF HUMAN ERRORS IN CHEMICAL ANALYSIS I KUSELMAN APPLICATION OF NONPARAMETRIC GOODNESS OF FIT TESTS PROBLEMS AND SOLUTION B YU LEMESHKO DYNAMIC MEASUREMENTS BASED ON AUTOMATIC CONTROL THEORY APPROACH A L SHESTAKOV MODELS FOR THE TREATMENT OF APPARENTLY INCONSISTENT DATA R WILLINK MODEL FOR EMOTION MEASUREMENTS IN ACOUSTIC SIGNALS AND ITS ANALYSIS Y BAKSHEEVA K SAPOZHNIKOVA AND R TAYMANOV UNCERTAINTY CALCULATION IN GRAVIMETRIC MICROFLOW MEASUREMENTS E BATISTA N ALMEIDA I GODINHO AND E FILIPE UNCERTAINTIES PROPAGATION FROM PUBLISHED EXPERIMENTAL DATA TO UNCERTAINTIES OF MODEL PARAMETERS ADJUSTED BY THE LEAST SQUARES V I BELOUSOV V V EZHELA Y V KUYANOV S B LUGOVSKY K S LUGOVSKY AND N P TKACHENKO A NEW APPROACH FOR THE MATHEMATICAL ALIGNMENT MACHINE TOOL PATHS ON A FIVE AXIS MACHINE AND ITS EFFECT ON SURFACE ROUGHNESS S BOUKEBBAB J CHAVES JACOB J M LINARES AND N AZZAM GOODNESS OF FIT TESTS FOR ONE SHOT DEVICE TESTING DATA E V CHIMITOVA AND N BALAKRISHAN CALCULATION OF COVERAGE INTERVALS SOME STUDY CASES A STEPANOV A CHUNOVKINA AND N BURMISTROVA APPLICATION OF NUMERICAL METHODS IN METROLOGY OF ELECTROMAGNETIC QUANTITIES M CUNDEVA BLAJER CALIBRATION METHOD OF MEASURING INSTRUMENTS IN OPERATING CONDITIONS A A DANILOV YU V KUCHERENKO M V BERZHINSKAYA N P ORDINARTSEVA STATISTICAL METHODS FOR CONFORMITY ASSESSMENT WHEN DEALING WITH COMPUTATIONALLY EXPENSIVE SYSTEMS APPLICATION TO A FIRE ENGINEERING CASE STUDY S DEMEYER N FISCHER F DIDIEUX AND M BINACCHI OVERVIEW OF EMRP JOINT RESERCH PROJECT NEW06 TRACEABILITY FOR COMPUTATIONALLY INTENSIVE METROLOGY A B FORBES I M SMITH F H[?] RTIG AND K WENDT STABLE UNITS OF ACCOUNT FOR ECONOMIC VALUE CORRECT MEASURING N HOVANOV A NOVEL APPROACH FOR UNCERTAINTY EVALUATION USING CHARACTERISTIC FUNCTION THEORY A B IONOV N S CHERNYSHEVA AND B P IONOV ESTIMATION OF TEST UNCERTAINTY FOR TRACIM REFERENCE PAIRS F KELLER K WENDT AND F H[?] RTIG APPROACHES FOR ASSIGNING NUMERICAL UNCERTAINTY TO REFERENCE DATA PAIRS FOR SOFTWARE VALIDATION G J P KOK AND I M SMITH UNCERTAINTY EVALUATION FOR A COMPUTATIONALLY EXPENSIVE MODEL OF A SONIC NOZZLE G J P KOK AND N PELEVIC ELLIPSEFIT4HC A MATLAB ALGORITHM FOR DEMODULATION AND UNCERTAINTY EVALUATION OF THE QUADRATURE INTERFEROMETER SIGNALS R K[?] NING G WIMMER AND V WITKOVSK[?] CONSIDERATIONS ON THE INFLUENCE OF TEST EQUIPMENT INSTABILITY AND CALIBRATION METHODS ON MEASUREMENT UNCERTAINTY OF THE TEST LABORATORY A S KRIVOV S V MARINKO AND I G BOYKO A CARTESIAN METHOD TO IMPROVE THE RESULTS AND SAVE COMPUTATION TIME IN BAYESIAN SIGNAL ANALYSIS G A KYRIAZIS THE DEFINITION OF THE RELIABILITY OF IDENTIFICATION OF COMPLEX ORGANIC COMPOUNDS USING HPLC AND BASE CHROMATOGRAPHIC AND SPECTRAL DATA E V KULYABINA AND YU A KUDEYAROV UNCERTAINTY EVALUATION OF FLUID DYNAMIC SIMULATION WITH ONE DIMENSIONAL RISER MODEL BY MEANS OF STOCHASTIC DIFFERENTIAL EQUATIONS E A O LIMA S B MELO C C DANTAS F A S TELES AND S SOARES BANDIERA SIMULATION METHOD TO ESTIMATE THE UNCERTAINTIES OF ISO SPECIFICATIONS J M LINARES AND J M SPRAUEL ADDING A VIRTUAL LAYER IN A SENSOR NETWORK TO IMPROVE MEASUREMENT RELIABILITY U MANISCALCO AND R RIZZO CALIBRATION ANALYSIS OF A COMPUTATIONAL

OPTICAL SYSTEM APPLIED IN THE DIMENSIONAL MONITORING OF A SUSPENSION BRIDGE L L MARTINS J M REBORDO AND A S RIBEIRO DETERMINATION OF NUMERICAL UNCERTAINTY ASSOCIATED WITH NUMERICAL ARTEFACTS FOR VALIDATING COORDINATE METROLOGY SOFTWARE H D MINH I M SMITH AND A B FORBES LEAST SQUARES METHOD AND TYPE B EVALUATION OF STANDARD UNCERTAINTY R PALEN R S URI P PAVL SEK M DOVICA S SLOSAR K AND G WIMMER OPTIMISING MEASUREMENT PROCESSES USING AUTOMATED PLANNING S PARKINSON A CRAMPTON AND A P LONGSTAFF SOFTWARE TOOL FOR CONVERSION OF HISTORICAL TEMPERATURE SCALES P PAVL SEK S URI R PALEN R AND A MERLONE FEW MEASUREMENTS NON NORMALITY A STATEMENT ON THE EXPANDED UNCERTAINTY J PETRY B DE BOECK M DOBRE AND A PERUZZI QUANTIFYING UNCERTAINTY IN ACCELEROMETER SENSITIVITY STUDIES A L RUKHIN AND D J EVANS METROLOGICAL ASPECTS OF STOPPING ITERATIVE PROCEDURES IN INVERSE PROBLEMS FOR STATIC MODE MEASUREMENTS K K SEMENOV INVERSE PROBLEMS IN THEORY AND PRACTICE OF MEASUREMENTS AND METROLOGY K K SEMENOV G N SOLOPCHENKO AND V YA KREINOVICH FUZZY INTERVALS AS FOUNDATION OF METROLOGICAL SUPPORT FOR COMPUTATIONS WITH INACCURATE DATA K K SEMENOV G N SOLOPCHENKO AND V YA KREINOVICH TESTING STATISTICAL HYPOTHESES FOR GENERALIZED SEMIPARAMETRIC PROPORTIONAL HAZARDS MODELS WITH CROSS EFFECT OF SURVIVAL FUNCTIONS M A SEMENOVA AND E V CHIMITOVA NOVEL REFERENCE VALUE AND DOE DETERMINATION BY MODEL SELECTION AND POSTERIOR PREDICTIVE CHECKING K SHIRONO H TANAKA M SHIRO AND K EHARA CERTIFICATION OF ALGORITHMS FOR CONSTRUCTING CALIBRATION CURVES OF MEASURING INSTRUMENTS T SIRAYA DISCRETE AND FUZZY ENCODING OF THE ECG SIGNAL FOR MULTIDISEASE DIAGNOSTIC SYSTEM V USPENSKIY K VORONTSOV V TSELYKH AND V BUNAKOV APPLICATION OF TWO ROBUST METHODS IN INTER LABORATORY COMPARISONS WITH SMALL SAMPLES E T VOLODARSKY AND Z L WARSZA VALIDATION OF CMM EVALUATION SOFTWARE USING TRACIM K WENDT M FRANKE AND F H RTIG SEMI PARAMETRIC POLYNOMIAL METHOD FOR RETROSPECTIVE ESTIMATION OF THE CHANGE POINT OF PARAMETERS OF NON GAUSSIAN SEQUENCES S V ZABOLOTNII AND Z L WARSZA USE OF A BAYESIAN APPROACH TO IMPROVE UNCERTAINTY OF MODEL BASED MEASUREMENTS BY HYBRID MULTI TOOL METROLOGY N F ZHANG B M BARNES R M SILVER AND H ZHOU APPLICATION OF EFFECTIVE NUMBER OF OBSERVATIONS AND EFFECTIVE DEGREES OF FREEDOM FOR ANALYSIS OF AUTOCORRELATED OBSERVATIONS A ZIEBA READERSHIP RESEARCHERS GRADUATE STUDENTS ACADEMICS AND PROFESSIONALS IN METROLOGY KEY FEATURES UNIQUE CONSOLIDATED SERIES OF BOOKS STARTED IN 1993 IN MATHEMATICS STATISTICS AND SOFTWARE SPECIFICALLY FOR METROLOGY AND TESTING AUTHORS ARE AMONG THE MOST PROMINENT IN THE METROLOGY AND TESTING FIELDS NO COMPETING BOOKS IN THE SAME COMPREHENSIVE FIELD KEYWORDS MATHEMATICS STATISTICS MODELING UNCERTAINTY METROLOGY TESTING COMPUTATIONAL TOOLS MEASUREMENT SCIENCE THIS VOLUME CONTAINS ORIGINAL REFEREED CONTRIBUTIONS BY RESEARCHERS FROM NATIONAL METROLOGY INSTITUTES UNIVERSITIES AND LABORATORIES ACROSS THE WORLD INVOLVED IN METROLOGY AND TESTING THE VOLUME HAS BEEN PRODUCED BY THE INTERNATIONAL MEASUREMENT CONFEDERATION TECHNICAL COMMITTEE 21 MATHEMATICAL TOOLS FOR MEASUREMENTS AND IS THE TWELFTH IN THE SERIES THE PAPERS COVER TOPICS IN NUMERICAL ANALYSIS AND COMPUTATIONAL TOOLS STATISTICAL INFERENCE REGRESSION CALIBRATION AND METROLOGICAL TRACEABILITY COMPUTER SCIENCE AND DATA PROVENANCE AND DESCRIBE APPLICATIONS IN A WIDE RANGE OF APPLICATION DOMAINS THIS VOLUME IS USEFUL TO ALL RESEARCHERS ENGINEERS AND PRACTITIONERS WHO NEED TO CHARACTERIZE THE CAPABILITIES OF MEASUREMENT SYSTEMS AND EVALUATE MEASUREMENT DATA IT WILL ALSO BE OF INTEREST TO SCIENTISTS AND ENGINEERS CONCERNED WITH THE RELIABILITY TRUSTWORTHINESS AND REPRODUCIBILITY OF DATA AND DATA ANALYTICS IN DATA DRIVEN SYSTEMS IN ENGINEERING ENVIRONMENTAL AND LIFE SCIENCES THIS VOLUME CONTAINS ORIGINAL REFEREED CONTRIBUTIONS BY RESEARCHERS FROM INSTITUTIONS AND LABORATORIES ACROSS THE WORLD THAT ARE INVOLVED IN METROLOGY AND TESTING THEY WERE ADAPTED FROM PRESENTATIONS MADE AT THE ELEVENTH EDITION OF THE ADVANCED MATHEMATICAL AND COMPUTATIONAL TOOLS IN METROLOGY AND TESTING CONFERENCE HELD AT THE UNIVERSITY OF STRATHCLYDE GLASGOW IN SEPTEMBER 2017 ORGANIZED BY IMEKO TECHNICAL COMMITTEE 21 THE NATIONAL PHYSICAL LABORATORY UK AND THE UNIVERSITY OF STRATHCLYDE THE PAPERS PRESENT NEW MODELING APPROACHES ALGORITHMS AND COMPUTATIONAL METHODS FOR ANALYZING DATA FROM METROLOGY SYSTEMS AND FOR EVALUATION OF THE MEASUREMENT UNCERTAINTY AND DESCRIBE THEIR APPLICATIONS IN A WIDE RANGE OF MEASUREMENT AREAS THIS VOLUME IS USEFUL TO ALL RESEARCHERS ENGINEERS AND PRACTITIONERS WHO NEED TO CHARACTERIZE THE CAPABILITIES OF MEASUREMENT SYSTEMS AND EVALUATE MEASUREMENT DATA THROUGH THE PAPERS WRITTEN BY EXPERTS WORKING IN LEADING INSTITUTIONS IT COVERS THE LATEST COMPUTATIONAL APPROACHES AND DESCRIBES APPLICATIONS TO CURRENT MEASUREMENT CHALLENGES IN ENGINEERING ENVIRONMENT AND LIFE SCIENCES INVESTIGATING THE INCESSANT TECHNOLOGY GROWTH AND THE EVEN HIGHER COMPLEXITY OF ENGINEERING SYSTEMS ONE OF THE CRUCIAL REQUIREMENTS TO CONFIDENTLY STEER BOTH SCIENTIFIC AND INDUSTRIAL CHALLENGES IS TO IDENTIFY AN APPROPRIATE MEASUREMENT APPROACH A GENERAL PROCESS CAN BE CONSIDERED EFFECTIVE AND UNDER CONTROL IF THE FOLLOWING ELEMENTS ARE CONSCIOUSLY AND CYCLICALLY MANAGED NUMERIC TARGET ADEQUATE TOOLS OUTPUT ANALYSIS AND CORRECTIVE ACTIONS THE ROLE OF METROLOGY IS TO RIGOROUSLY HARMONIZE THIS VIRTUOUS CIRCLE PROVIDING GUIDANCE IN TERMS OF INSTRUMENTS STANDARDS AND TECHNIQUES TO IMPROVE THE ROBUSTNESS AND THE ACCURACY OF THE RESULTS THIS BOOK IS DESIGNED TO OFFER AN INTERDISCIPLINARY EXPERIENCE INTO THE SCIENCE OF MEASUREMENT NOT ONLY COVERING HIGH LEVEL MEASUREMENT STRATEGIES BUT ALSO SUPPLYING ANALYTICAL DETAILS AND EXPERIMENTAL SETUPS THIS BOOK PROVIDE A COMPREHENSIVE SET OF MODELING METHODS FOR DATA AND UNCERTAINTY ANALYSIS TAKING READERS BEYOND MAINSTREAM METHODS AND FOCUSING ON TECHNIQUES WITH A BROAD RANGE OF REAL WORLD APPLICATIONS THE BOOK WILL BE USEFUL AS A TEXTBOOK FOR GRADUATE STUDENTS OR AS A TRAINING MANUAL IN THE FIELDS OF

CALIBRATION AND TESTING THE WORK MAY ALSO SERVE AS A REFERENCE FOR METROLOGISTS MATHEMATICIANS STATISTICIANS SOFTWARE ENGINEERS CHEMISTS AND OTHER PRACTITIONERS WITH A GENERAL INTEREST IN MEASUREMENT SCIENCE ELECTRICAL MOTOR PRODUCTS REVIEWS THE ENERGY EFFICIENCY MANAGEMENT LAWS FOR ELECTRICAL MOTOR PRODUCTS IN UNITED STATES EUROPEAN UNION EU AND CHINA THE ENERGY EFFICIENCY CERTIFICATION REQUIREMENTS FOR THE ELECTRICAL MOTOR PRODUCTS VARY FROM COUNTRY TO COUNTRY AND ARE SUMMARISED HERE INTERNATIONAL STANDARDS TESTING METHODS AND CERTIFICATION REQUIREMENTS FOR SPECIFIC ELECTRICAL MOTOR PRODUCTS ARE DISCUSSED INCLUDING ELECTRIC MOTORS PUMPS AND FANS FINALLY METHODS FOR IMPROVING ENERGY EFFICIENCY ARE EXAMINED REVIEWS THE ENERGY EFFICIENCY MANAGEMENT LAWS FOR ELECTRICAL MOTOR PRODUCTS IN UNITED STATES EUROPEAN UNION EU AND CHINA HIGHLIGHTS THE IMPORTANCE OF ENERGY EFFICIENCY FOR ELECTRICAL MOTOR PRODUCTS DOCUMENTS ENERGY EFFICIENCY CERTIFICATION REQUIREMENTS FOR ELECTRICAL MOTOR PRODUCTS AND HOW THEY VARY FROM COUNTRY TO COUNTRY THIS UNIQUE COLLECTION OF CHAPTERS FROM WORLD EXPERTS ON PERSON CENTERED OUTCOME PCO MEASURES ADDRESSES THE FOLLOWING CRITICAL QUESTIONS CAN INDIVIDUAL EXPERIENCES BE REPRESENTED IN MEASUREMENTS THAT DO NOT REDUCE UNIQUE DIFFERENCES TO MEANINGLESS UNIFORMITY HOW PERSON CENTRIC ARE PCO MEASURES ARE PCO MEASUREMENTS CAPABLE OF DELIVERING THE KIND OF QUALITY ASSURED QUANTIFICATION REQUIRED FOR HIGH STAKES DECISION MAKING ARE PCO MEASURES LIKELY TO SUPPORT IMPROVED HEALTH CARE DELIVERY HAVE PIVOTAL CLINICAL STUDIES FAILED TO DELIVER TREATMENTS FOR DISEASES BECAUSE OF SHORTCOMINGS IN THE PCO MEASURES USED ARE THESE SHORTCOMINGS PRIMARILY MATTERS OF PRECISION AND MEANINGFULNESS OR IS THE LACK OF COMMON LANGUAGES FOR COMMUNICATING OUTCOMES ALSO DEBILITATING TO QUALITY IMPROVEMENT RESEARCH AND THE HEALTH CARE ECONOMY THREE KEY ISSUES FORM AN URGENT BASIS FOR FURTHER INVESTIGATION FIRST THE NUMBERS GENERATED BY PCO MEASURES ARE INCREASINGLY USED AS THE CENTRAL DEPENDENT VARIABLES UPON WHICH HIGH STAKES DECISIONS ARE MADE THE RISING PROFILE OF PCO MEASURES PLACES NEW DEMANDS FOR HIGHER QUALITY INFORMATION FROM SCALE AND TEST CONSTRUCTION EVALUATION SELECTION AND INTERPRETATION SECOND PCO MEASUREMENT SCIENCE HAS WELL ESTABLISHED LESSONS TO BE LEARNED FROM THOSE WHO HAVE BUILT AND ESTABLISHED THE SCIENCE OVER MANY DECADES FINALLY THE GOAL IN MAKING A PCO MEASUREMENT IS TO INFORM OUTCOME MANAGEMENT AS SUCH IT IS VITALLY IMPORTANT THAT KEY STAKEHOLDERS UNDERSTAND THAT OVER THE LAST HALF CENTURY DEVELOPMENTS IN PSYCHOMETRICS HAVE REFOCUSSED MEASUREMENT ON ILLUMINATING CLINICALLY IMPORTANT INDIVIDUAL DIFFERENCES IN THE CONTEXT OF WIDELY REPRODUCED PATTERNS OF VARIATION IN HEALTH AND FUNCTIONING COMPARABLE SCALE VALUES FOR QUALITY IMPROVEMENT AND PRACTICAL EXPLANATORY MODELS THIS BOOK S AUDIENCE INCLUDES ANYONE INTERESTED IN PERSON CENTERED CARE INCLUDING HEALTHCARE RESEARCHERS AND PRACTITIONERS POLICY MAKERS PHARMACEUTICAL INDUSTRY REPRESENTATIVES CLINICIANS PATIENT ADVOCATES AND METROLOGISTS THIS IS AN OPEN ACCESS BOOK MEASUREMENTS WITH PERSONS ARE THOSE IN WHICH HUMAN PERCEPTION AND INTERPRETATION ARE USED FOR MEASURING COMPLEX HOLISTIC QUANTITIES AND QUALITIES WHICH ARE PERCEIVED BY THE HUMAN BRAIN AND MIND PROVIDING MEANS FOR REPRODUCIBLE MEASUREMENT OF PARAMETERS SUCH AS PLEASURE AND PAIN HAS IMPORTANT IMPLICATIONS IN EVALUATING ALL KIND OF PRODUCTS SERVICES AND CONDITIONS THIS BOOK INAUGURATES A NEW ERA FOR THIS SUBJECT A MULTI AND INTER DISCIPLINARY VOLUME IN WHICH WORLD RENOWNED SCIENTISTS FROM THE PSYCHOLOGICAL PHYSICAL BIOLOGICAL AND SOCIAL SCIENCES REACH A COMMON UNDERSTANDING OF MEASUREMENT THEORY AND METHODS IN THE FIRST SECTION GENERIC THEORETICAL AND METHODOLOGICAL ISSUES ARE TREATED INCLUDING THE CONCEPTUAL BASIS OF MEASUREMENT IN THE VARIOUS FIELDS INVOLVED THE DEVELOPMENT OF FORMAL REPRESENTATIONAL AND PROBABILISTIC THEORIES THE APPROACH TO EXPERIMENTATION AND THE THEORIES MODELS AND METHODS FOR MULTIDIMENSIONAL PROBLEMS IN THE SECOND SECTION SEVERAL IMPLEMENTATION AREAS ARE PRESENTED INCLUDING SOUND VISUAL SKIN AND ODOR PERCEPTION FUNCTIONAL BRAIN IMAGING BODY LANGUAGE AND EMOTIONS AND FINALLY THE USE OF MEASUREMENTS IN DECISION MAKING MEASUREMENT WITH PERSONS WILL APPEAL TO A WIDE AUDIENCE ACROSS A RANGE OF SCIENCES INCLUDING GENERAL PSYCHOLOGY AND PSYCHOPHYSICS MEASUREMENT THEORY METROLOGY AND INSTRUMENTATION NEUROPHYSIOLOGY ENGINEERING BIOLOGY AND CHEMISTRY THIS BOOK CONSISTS OF PAPERS PRESENTED AT AUTOMATION 2018 AN INTERNATIONAL CONFERENCE HELD IN WARSAW FROM MARCH 21 TO 23 2018 IT DISCUSSES THE RADICAL TECHNOLOGICAL CHANGES OCCURRING DUE TO THE INDUSTRY 4 0 WITH A FOCUS ON OFFERING A BETTER UNDERSTANDING OF THE FOURTH INDUSTRIAL REVOLUTION EACH CHAPTER PRESENTS A DETAILED ANALYSIS OF INTERDISCIPLINARY KNOWLEDGE NUMERICAL MODELING AND SIMULATION AS WELL AS THE APPLICATION OF CYBER PHYSICAL SYSTEMS WHERE INFORMATION TECHNOLOGY AND PHYSICAL DEVICES CREATE SYNERGIC SYSTEMS LEADING TO UNPRECEDENTED EFFICIENCY THE THEORETICAL RESULTS PRACTICAL SOLUTIONS AND GUIDELINES PRESENTED ARE VALUABLE FOR BOTH RESEARCHERS WORKING IN THE AREA OF ENGINEERING SCIENCES AND PRACTITIONERS LOOKING FOR SOLUTIONS TO INDUSTRIAL PROBLEMS THIS BOOK PRESENTS THE SET OF PAPERS ACCEPTED FOR PRESENTATION AT THE INTERNATIONAL CONFERENCE AUTOMATION HELD IN WARSAW 2 4 MARCH OF 2016 IT PRESENTS THE RESEARCH RESULTS PRESENTED BY TOP EXPERTS IN THE FIELDS OF INDUSTRIAL AUTOMATION CONTROL ROBOTICS AND MEASUREMENT TECHNIQUES EACH CHAPTER PRESENTS A THOROUGH ANALYSIS OF A SPECIFIC TECHNICAL PROBLEM WHICH IS USUALLY FOLLOWED BY NUMERICAL ANALYSIS SIMULATION AND DESCRIPTION OF RESULTS OF IMPLEMENTATION OF THE SOLUTION OF A REAL WORLD PROBLEM THE PRESENTED THEORETICAL RESULTS PRACTICAL SOLUTIONS AND GUIDELINES WILL BE VALUABLE FOR BOTH RESEARCHERS WORKING IN THE AREA OF ENGINEERING SCIENCES AND FOR PRACTITIONERS SOLVING INDUSTRIAL PROBLEMS THIS VOLUME CONTAINS ORIGINAL REFEREED WORLDWIDE CONTRIBUTIONS THEY WERE PROMPTED BY PRESENTATIONS MADE AT THE NINTH AMCTM CONFERENCE HELD IN GOTEBORG

SWEDEN IN JUNE 2011 ON THE THEME OF ADVANCED MATHEMATICAL AND COMPUTATIONAL TOOLS IN METROLOGY AND ALSO IN THE TITLE OF THIS BOOK SERIES IN TESTING THE THEMES IN THIS VOLUME REFLECT THE IMPORTANCE OF THE MATHEMATICAL STATISTICAL AND NUMERICAL TOOLS AND TECHNIQUES IN METROLOGY AND TESTING AND ALSO IN KEEPING THE CHALLENGE PROMOTED BY THE METRE CONVENTION TO ACCESS A MUTUAL RECOGNITION FOR THE MEASUREMENT STANDARDS THIS CONTRIBUTED BOOK FOCUSES ON MAJOR ASPECTS OF STATISTICAL QUALITY CONTROL SHARES INSIGHTS INTO IMPORTANT NEW DEVELOPMENTS IN THE FIELD AND ADAPTS ESTABLISHED STATISTICAL QUALITY CONTROL METHODS FOR USE IN E G BIG DATA NETWORK ANALYSIS AND MEDICAL APPLICATIONS THE CONTENT IS DIVIDED INTO TWO PARTS THE FIRST OF WHICH MAINLY ADDRESSES STATISTICAL PROCESS CONTROL ALSO KNOWN AS STATISTICAL PROCESS MONITORING IN TURN THE SECOND PART EXPLORES SELECTED TOPICS IN STATISTICAL QUALITY CONTROL INCLUDING MEASUREMENT UNCERTAINTY ANALYSIS AND DATA QUALITY THE PEER REVIEWED CONTRIBUTIONS GATHERED HERE WERE ORIGINALLY PRESENTED AT THE 13TH INTERNATIONAL WORKSHOP ON INTELLIGENT STATISTICAL QUALITY CONTROL ISQC 2019 HELD IN HONG KONG ON AUGUST 12 14 2019 TAKEN TOGETHER THEY BRIDGE THE GAP BETWEEN THEORY AND PRACTICE MAKING THE BOOK OF INTEREST TO BOTH PRACTITIONERS AND RESEARCHERS IN THE FIELD OF STATISTICAL QUALITY CONTROL IT IS NOW BECOMING RECOGNIZED IN THE MEASUREMENT COMMUNITY THAT IT IS AS IMPORTANT TO COMMUNICATE THE UNCERTAINTY RELATED TO A SPECIFIC MEASUREMENT AS IT IS TO REPORT THE MEASUREMENT ITSELF WITHOUT KNOWING THE UNCERTAINTY IT IS IMPOSSIBLE FOR THE USERS OF THE RESULT TO KNOW WHAT CONFIDENCE CAN BE PLACED IN IT IT IS ALSO IMPOSSIBLE TO ASSESS THE COMPARABILITY OF DIFFERENT MEASUREMENTS OF THE SAME PARAMETER THIS VOLUME COLLECTS 20 OUTSTANDING PAPERS ON THE TOPIC MOSTLY PUBLISHED FROM 1999 2002 IN THE JOURNAL ACCREDITATION AND QUALITY ASSURANCE THEY PROVIDE THE RATIONALE FOR WHY IT IS IMPORTANT TO EVALUATE AND REPORT THE UNCERTAINTY OF A RESULT IN A CONSISTENT MANNER THEY ALSO DESCRIBE THE CONCEPT OF UNCERTAINTY THE METHODOLOGY FOR EVALUATING UNCERTAINTY AND THE ADVANTAGES OF USING SUITABLE REFERENCE MATERIALS FINALLY THE BENEFITS TO BOTH THE ANALYTICAL LABORATORY AND THE USER OF THE RESULTS ARE CONSIDERED THIS BOOK CONTAINS 38 PAPERS AUTHORED BY BOTH SCIENTISTS AND PRACTITIONERS FOCUSED ON AN INTERDISCIPLINARY APPROACH TO THE DEVELOPMENT OF CYBER PHYSICAL SYSTEMS RECENTLY OUR CIVILIZATION HAS BEEN FACING ONE OF THE MOST SEVERE CHALLENGES IN MODERN HISTORY THE COVID 19 PANDEMIC DEVASTATED THE GLOBAL ECONOMY AND SIGNIFICANTLY DISRUPTED NUMEROUS AREAS OF ECONOMIC ACTIVITY ONLY RADICAL INCREASE OF EFFICIENCY AND VERSATILITY OF INDUSTRIAL PRODUCTION WITH FURTHER LIMITATION OF HUMAN INVOLVEMENT PARALLELED BY THE DECREASE OF ENVIRONMENTAL BURDEN WILL ENABLE US TO COPE WITH SUCH CHALLENGES WE HOPE THAT THE PRESENTED BOOK PROVIDES INPUT TO THE SOLUTION OF AT LEAST SOME PROBLEMS BROUGHT ABOUT BY THIS CHALLENGE THIS APPROACH RELIES ON THE DEVELOPMENT OF MEASURING TECHNIQUES ROBOTIC AND MECHATRONIC SYSTEMS INDUSTRIAL AUTOMATION NUMERICAL MODELING AND SIMULATION AS WELL AS APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNIQUES REQUIRED BY THE TRANSFORMATION LEADING TO INDUSTRY 4 0 THIS BOOK PRESENTS A GENERAL AND COMPREHENSIVE FRAMEWORK FOR THE ASSURANCE OF QUALITY IN MEASUREMENTS WRITTEN BY A FOREMOST EXPERT IN THE FIELD THE TEXT REFLECTS AN ON GOING INTERNATIONAL EFFORT TO EXTEND TRADITIONAL QUALITY ASSURED MEASUREMENT ROOTED IN FUNDAMENTAL PHYSICS AND THE SI TO INCLUDE NON PHYSICAL AREAS SUCH AS PERSON CENTRED CARE AND THE SOCIAL SCIENCES MORE GENERALLY CHAPTER BY CHAPTER THE BOOK FOLLOWS THE MEASUREMENT QUALITY ASSURANCE LOOP BASED ON DEMING S WORK THE AUTHOR ENHANCES THIS QUALITY ASSURANCE CYCLE WITH INSIGHTS FROM RECENT RESEARCH INCLUDING WORK ON THE POLITICS AND PHILOSOPHY OF METROLOGY THE NEW SI QUANTITATIVE AND QUALITATIVE SCALES AND ENTROPY DECISION RISKS AND UNCERTAINTY WHEN ADDRESSING HUMAN CHALLENGES MAN AS A MEASUREMENT INSTRUMENT AND PSYCHOMETRY AND PERSON CENTRED CARE QUALITY ASSURED MEASUREMENT UNIFICATION ACROSS SOCIAL AND PHYSICAL SCIENCES PROVIDES STUDENTS AND RESEARCHERS IN PHYSICS CHEMISTRY ENGINEERING MEDICINE AND THE SOCIAL SCIENCES WITH PRACTICAL GUIDANCE ON DESIGNING IMPLEMENTING AND APPLYING A QUALITY ASSURED MEASUREMENT WHILE ENGAGING READERS IN THE MOST NOVEL AND EXPANSIVE AREAS OF CONTEMPORARY MEASUREMENT RESEARCH ADVANCES IN METROLOGY DEPEND ON IMPROVEMENTS IN SCIENTIFIC AND TECHNICAL KNOWLEDGE AND IN INSTRUMENTATION QUALITY AS WELL AS BETTER USE OF ADVANCED MATHEMATICAL TOOLS AND DEVELOPMENT OF NEW ONES IN THIS VOLUME SCIENTISTS FROM BOTH THE MATHEMATICAL AND THE METROLOGICAL FIELDS EXCHANGE THEIR EXPERIENCES INDUSTRIAL SECTORS SUCH AS INSTRUMENTATION AND SOFTWARE ARE LIKELY TO BENEFIT FROM THIS EXCHANGE SINCE METROLOGY HAS A HIGH IMPACT ON THE OVERALL QUALITY OF INDUSTRIAL PRODUCTS AND APPLIED MATHEMATICS IS BECOMING MORE AND MORE IMPORTANT IN INDUSTRIAL PROCESSES THIS BOOK IS OF INTEREST TO PEOPLE IN UNIVERSITIES RESEARCH CENTERS AND INDUSTRIES WHO ARE INVOLVED IN MEASUREMENTS AND NEED ADVANCED MATHEMATICAL TOOLS TO SOLVE THEIR PROBLEMS AND TO THOSE DEVELOPING SUCH MATHEMATICAL TOOLS CONTENTS AN EFFICIENT ALGORITHM FOR TEMPLATE MATCHING I J ANDERSON ET AL AN APPLICATION OF BOOTSTRAP REGRESSION TO METROLOGICAL DATA WITH ERRORS IN BOTH VARIABLES P CIARLINI G REGOLIOSI EVALUATION OF LATERAL SHEARING INTERFEROGRAMS C ELSTER FUSING PRIOR CALIBRATION INFORMATION IN METROLOGY DATA ANALYSIS A B FORBES SOFTWARE ENGINEERING RELATED STANDARDS AND GUIDELINES FOR METROLOGY N GREIF D RICHTER VIRTUAL TESTING INTERACTION WITH A COMPOSITE MODEL USING THE INTERNET N J MCCORMICK MATHEMATICAL PROBLEMS IN THE DEFINITION OF STANDARDS BASED ON SCALES THE CASE OF TEMPERATURE F PAVESE DISCUSSION OF METHODS FOR THE ASSESSMENT OF UNCERTAINTIES IN MONTE CARLO PARTICLE TRANSPORT CALCULATIONS B R L SIEBERT SOME ROBUST METHODS FOR FITTING PARAMETRICALLY DEFINED CURVES OR SURFACES TO MEASURED DATA G A WATSON AND OTHER PAPERS READERSHIP RESEARCHERS IN METROLOGICAL INSTITUTES UNIVERSITIES MEASUREMENT SCIENCE AND INDUSTRIES

ADVANCED MATHEMATICAL AND COMPUTATIONAL TOOLS IN METROLOGY AND TESTING VIII 2009 THE MAIN THEME OF THE AMCTM 2008 CONFERENCE REINFORCED BY THE ESTABLISHMENT OF IMEKO TC21 WAS TO PROVIDE A CENTRAL OPPORTUNITY FOR THE METROLOGY AND TESTING COMMUNITY WORLDWIDE TO ENGAGE WITH APPLIED MATHEMATICIANS STATISTICIANS AND SOFTWARE ENGINEERS WORKING IN THE RELEVANT FIELDS THIS REVIEW VOLUME CONSISTS OF REVIEWED PAPERS PREPARED ON THE BASIS OF THE ORAL AND POSTER PRESENTATIONS OF THE CONFERENCE PARTICIPANTS IT COVERS ALL THE GENERAL MATTERS OF ADVANCED STATISTICAL MODELING E G UNCERTAINTY EVALUATION EXPERIMENTAL DESIGN OPTIMIZATION DATA ANALYSIS AND APPLICATIONS MULTIPLE MEASURANDS CORRELATION ETC METROLOGY SOFTWARE E G ENGINEERING ASPECTS REQUIREMENTS OR SPECIFICATION RISK ASSESSMENT SOFTWARE DEVELOPMENT SOFTWARE EXAMINATION SOFTWARE TOOLS FOR DATA ANALYSIS VISUALIZATION EXPERIMENT CONTROL BEST PRACTICE STANDARDS ETC NUMERICAL METHODS E G NUMERICAL DATA ANALYSIS NUMERICAL SIMULATIONS INVERSE PROBLEMS UNCERTAINTY EVALUATION OF NUMERICAL ALGORITHMS APPLICATIONS ETC AND DATA FUSION TECHNIQUES AND DESIGN AND ANALYSIS OF INTER LABORATORY COMPARISONS

ADVANCED MATHEMATICAL AND COMPUTATIONAL TOOLS IN METROLOGY AND TESTING X 2015-04-22 THIS VOLUME CONTAINS ORIGINAL AND REFEREED CONTRIBUTIONS FROM THE TENTH AMCTM CONFERENCE NVIIM RU AMCTM2014 HELD IN ST PETERSBURG RUSSIA IN SEPTEMBER 2014 ON THE THEME OF ADVANCED MATHEMATICAL AND COMPUTATIONAL TOOLS IN METROLOGY AND TESTING THE THEMES IN THIS VOLUME REFLECT THE IMPORTANCE OF THE MATHEMATICAL STATISTICAL AND NUMERICAL TOOLS AND TECHNIQUES IN METROLOGY AND TESTING AND ALSO KEEPING THE CHALLENGE PROMOTED BY THE METRE CONVENTION TO ACCESS A MUTUAL RECOGNITION FOR THE MEASUREMENT STANDARDS CONTENTS FOSTERING DIVERSITY OF THOUGHT IN MEASUREMENT SCIENCE F PAVESE AND P DE BI[?] VRE POLYNOMIAL CALIBRATION FUNCTIONS REVISITED NUMERICAL AND STATISTICAL ISSUES M G COX AND P HARRIS EMPIRICAL FUNCTIONS WITH PRE ASSIGNED CORRELATION BEHAVIOUR A B FORBES MODELS AND METHODS OF DYNAMIC MEASUREMENTS RESULTS PRESENTED BY ST PETERSBURG METROLOGISTS V A GRANOVSKII INTERVAL COMPUTATIONS AND INTERVAL RELATED STATISTICAL TECHNIQUES ESTIMATING UNCERTAINTY OF THE RESULTS OF DATA PROCESSING AND INDIRECT MEASUREMENTS V YA KREINOVICH CLASSIFICATION MODELING AND QUANTIFICATION OF HUMAN ERRORS IN CHEMICAL ANALYSIS I KUSELMAN APPLICATION OF NONPARAMETRIC GOODNESS OF FIT TESTS PROBLEMS AND SOLUTION B YU LEMESHKO DYNAMIC MEASUREMENTS BASED ON AUTOMATIC CONTROL THEORY APPROACH A L SHESTAKOV MODELS FOR THE TREATMENT OF APPARENTLY INCONSISTENT DATA R WILLINK MODEL FOR EMOTION MEASUREMENTS IN ACOUSTIC SIGNALS AND ITS ANALYSIS Y BAKSHEEVA K SAPOZHNIKOVA AND R TAYMANOV UNCERTAINTY CALCULATION IN GRAVIMETRIC MICROFLOW MEASUREMENTS E BATISTA N ALMEIDA I GODINHO AND E FILIPE UNCERTAINTIES PROPAGATION FROM PUBLISHED EXPERIMENTAL DATA TO UNCERTAINTIES OF MODEL PARAMETERS ADJUSTED BY THE LEAST SQUARES V I BELOUSOV V V EZHELA Y V KUYANOV S B LUGOVSKY K S LUGOVSKY AND N P TKACHENKO A NEW APPROACH FOR THE MATHEMATICAL ALIGNMENT MACHINE TOOL PATHS ON A FIVE AXIS MACHINE AND ITS EFFECT ON SURFACE ROUGHNESS S BOUKEBBAB J CHAVES JACOB J M LINARES AND N AZZAM GOODNESS OF FIT TESTS FOR ONE SHOT DEVICE TESTING DATA E V CHIMITOVA AND N BALAKRISHAN CALCULATION OF COVERAGE INTERVALS SOME STUDY CASES A STEPANOV A CHUNOVKINA AND N BURMISTROVA APPLICATION OF NUMERICAL METHODS IN METROLOGY OF ELECTROMAGNETIC QUANTITIES M CUNDEVA BLAJER CALIBRATION METHOD OF MEASURING INSTRUMENTS IN OPERATING CONDITIONS A A DANILOV YU V KUCHERENKO M V BERZHINSKAYA N P ORDINARTSEVA STATISTICAL METHODS FOR CONFORMITY ASSESSMENT WHEN DEALING WITH COMPUTATIONALLY EXPENSIVE SYSTEMS APPLICATION TO A FIRE ENGINEERING CASE STUDY S DEMEYER N FISCHER F DIDIEUX AND M BINACCHI OVERVIEW OF EMRP JOINT RESERCH PROJECT NEW06 TRACEABILITY FOR COMPUTATIONALLY INTENSIVE METROLOGY A B FORBES I M SMITH F H[?] RTIG AND K WENDT STABLE UNITS OF ACCOUNT FOR ECONOMIC VALUE CORRECT MEASURING N HOVANOV A NOVEL APPROACH FOR UNCERTAINTY EVALUATION USING CHARACTERISTIC FUNCTION THEORY A B IONOV N S CHERNYSHEVA AND B P IONOV ESTIMATION OF TEST UNCERTAINTY FOR TRACIM REFERENCE PAIRS F KELLER K WENDT AND F H[?] RTIG APPROACHES FOR ASSIGNING NUMERICAL UNCERTAINTY TO REFERENCE DATA PAIRS FOR SOFTWARE VALIDATION G J P KOK AND I M SMITH UNCERTAINTY EVALUATION FOR A COMPUTATIONALLY EXPENSIVE MODEL OF A SONIC NOZZLE G J P KOK AND N PELEVIC ELLIPSEFIT4HC A MATLAB ALGORITHM FOR DEMODULATION AND UNCERTAINTY EVALUATION OF THE QUADRATURE INTERFEROMETER SIGNALS R K[?] NING G WIMMER AND V WITKOVSK[?] CONSIDERATIONS ON THE INFLUENCE OF TEST EQUIPMENT INSTABILITY AND CALIBRATION METHODS ON MEASUREMENT UNCERTAINTY OF THE TEST LABORATORY A S KRIVOV S V MARINKO AND I G BOYKO A CARTESIAN METHOD TO IMPROVE THE RESULTS AND SAVE COMPUTATION TIME IN BAYESIAN SIGNAL ANALYSIS G A KYRIAZIS THE DEFINITION OF THE RELIABILITY OF IDENTIFICATION OF COMPLEX ORGANIC COMPOUNDS USING HPLC AND BASE CHROMATOGRAPHIC AND SPECTRAL DATA E V KULYABINA AND YU A KUDEYAROV UNCERTAINTY EVALUATION OF FLUID DYNAMIC SIMULATION WITH ONE DIMENSIONAL RISER MODEL BY MEANS OF STOCHASTIC DIFFERENTIAL EQUATIONS E A O LIMA S B MELO C C DANTAS F A S TELES AND S SOARES BANDIERA SIMULATION METHOD TO ESTIMATE THE UNCERTAINTIES OF ISO SPECIFICATIONS J M LINARES AND J M SPRAUEL ADDING A VIRTUAL LAYER IN A SENSOR NETWORK TO IMPROVE MEASUREMENT RELIABILITY U MANISCALCO AND R RIZZO CALIBRATION ANALYSIS OF A COMPUTATIONAL OPTICAL SYSTEM APPLIED IN THE DIMENSIONAL MONITORING OF A SUSPENSION BRIDGE L L MARTINS J M REBORD[?] O AND A S RIBEIRO DETERMINATION OF NUMERICAL UNCERTAINTY ASSOCIATED WITH NUMERICAL ARTEFACTS FOR VALIDATING COORDINATE METROLOGY SOFTWARE H D MINH I M SMITH AND A B FORBES LEAST SQUARES METHOD AND TYPE B EVALUATION OF STANDARD UNCERTAINTY R PALEN[?] [?] R S [?] URI[?] P PAVL[?] SEK M DOVICA S SLOSAR[?] [?] K AND G WIMMER OPTIMISING MEASUREMENT PROCESSES USING AUTOMATED PLANNING S PARKINSON A CRAMPTON AND A P LONGSTAFF SOFTWARE TOOL FOR CONVERSION OF HISTORICAL TEMPERATURE SCALES

P PAVL^[2] SEK S^[2] URI^[2] R PALEN^[2] ^[2] R AND A MERLONE FEW MEASUREMENTS NON NORMALITY A STATEMENT ON THE EXPANDED UNCERTAINTY J PETRY B DE BOECK M DOBRE AND A PERUZZI QUANTIFYING UNCERTAINTY IN ACCELEROMETER SENSITIVITY STUDIES A L RUKHIN AND D J EVANS METROLOGICAL ASPECTS OF STOPPING ITERATIVE PROCEDURES IN INVERSE PROBLEMS FOR STATIC MODE MEASUREMENTS K K SEMENOV INVERSE PROBLEMS IN THEORY AND PRACTICE OF MEASUREMENTS AND METROLOGY K K SEMENOV G N SOLOPCHENKO AND V YA KREINOVICH FUZZY INTERVALS AS FOUNDATION OF METROLOGICAL SUPPORT FOR COMPUTATIONS WITH INACCURATE DATA K K SEMENOV G N SOLOPCHENKO AND V YA KREINOVICH TESTING STATISTICAL HYPOTHESES FOR GENERALIZED SEMIPARAMETRIC PROPORTIONAL HAZARDS MODELS WITH CROSS EFFECT OF SURVIVAL FUNCTIONS M A SEMENOVA AND E V CHIMITOVA NOVEL REFERENCE VALUE AND DOE DETERMINATION BY MODEL SELECTION AND POSTERIOR PREDICTIVE CHECKING K SHIRONO H TANAKA M SHIRO AND K EHARA CERTIFICATION OF ALGORITHMS FOR CONSTRUCTING CALIBRATION CURVES OF MEASURING INSTRUMENTS T SIRAYA DISCRETE AND FUZZY ENCODING OF THE ECG SIGNAL FOR MULTIDISEASE DIAGNOSTIC SYSTEM V USPENSKIY K VORONTSOV V TSELYKH AND V BUNAKOV APPLICATION OF TWO ROBUST METHODS IN INTER LABORATORY COMPARISONS WITH SMALL SAMPLES E T VOLODARSKY AND Z L WARSZA VALIDATION OF CMM EVALUATION SOFTWARE USING TRACIM K WENDT M FRANKE AND F H^[2] RTIG SEMI PARAMETRIC POLYNOMIAL METHOD FOR RETROSPECTIVE ESTIMATION OF THE CHANGE POINT OF PARAMETERS OF NON GAUSSIAN SEQUENCES S V ZABOLOTNII AND Z L WARSZA USE OF A BAYESIAN APPROACH TO IMPROVE UNCERTAINTY OF MODEL BASED MEASUREMENTS BY HYBRID MULTI TOOL METROLOGY N F ZHANG B M BARNES R M SILVER AND H ZHOU APPLICATION OF EFFECTIVE NUMBER OF OBSERVATIONS AND EFFECTIVE DEGREES OF FREEDOM FOR ANALYSIS OF AUTOCORRELATED OBSERVATIONS A ZIEBA READERSHIP RESEARCHERS GRADUATE STUDENTS ACADEMICS AND PROFESSIONALS IN METROLOGY KEY FEATURES UNIQUE CONSOLIDATED SERIES OF BOOKS STARTED IN 1993 IN MATHEMATICS STATISTICS AND SOFTWARE SPECIFICALLY FOR METROLOGY AND TESTING AUTHORS ARE AMONG THE MOST PROMINENT IN THE METROLOGY AND TESTING FIELDS NO COMPETING BOOKS IN THE SAME COMPREHENSIVE FIELD KEYWORDS MATHEMATICS STATISTICS MODELING UNCERTAINTY METROLOGY TESTING COMPUTATIONAL TOOLS MEASUREMENT SCIENCE

ADVANCED MATHEMATICAL AND COMPUTATIONAL TOOLS IN METROLOGY AND TESTING XII 2022-01-13 THIS VOLUME CONTAINS ORIGINAL REFEREED CONTRIBUTIONS BY RESEARCHERS FROM NATIONAL METROLOGY INSTITUTES UNIVERSITIES AND LABORATORIES ACROSS THE WORLD INVOLVED IN METROLOGY AND TESTING THE VOLUME HAS BEEN PRODUCED BY THE INTERNATIONAL MEASUREMENT CONFEDERATION TECHNICAL COMMITTEE 21 MATHEMATICAL TOOLS FOR MEASUREMENTS AND IS THE TWELFTH IN THE SERIES THE PAPERS COVER TOPICS IN NUMERICAL ANALYSIS AND COMPUTATIONAL TOOLS STATISTICAL INFERENCE REGRESSION CALIBRATION AND METROLOGICAL TRACEABILITY COMPUTER SCIENCE AND DATA PROVENANCE AND DESCRIBE APPLICATIONS IN A WIDE RANGE OF APPLICATION DOMAINS THIS VOLUME IS USEFUL TO ALL RESEARCHERS ENGINEERS AND PRACTITIONERS WHO NEED TO CHARACTERIZE THE CAPABILITIES OF MEASUREMENT SYSTEMS AND EVALUATE MEASUREMENT DATA IT WILL ALSO BE OF INTEREST TO SCIENTISTS AND ENGINEERS CONCERNED WITH THE RELIABILITY TRUSTWORTHINESS AND REPRODUCIBILITY OF DATA AND DATA ANALYTICS IN DATA DRIVEN SYSTEMS IN ENGINEERING ENVIRONMENTAL AND LIFE SCIENCES

ADVANCED MATHEMATICAL AND COMPUTATIONAL TOOLS IN METROLOGY AND TESTING XI 2018-10-16 THIS VOLUME CONTAINS ORIGINAL REFEREED CONTRIBUTIONS BY RESEARCHERS FROM INSTITUTIONS AND LABORATORIES ACROSS THE WORLD THAT ARE INVOLVED IN METROLOGY AND TESTING THEY WERE ADAPTED FROM PRESENTATIONS MADE AT THE ELEVENTH EDITION OF THE ADVANCED MATHEMATICAL AND COMPUTATIONAL TOOLS IN METROLOGY AND TESTING CONFERENCE HELD AT THE UNIVERSITY OF STRATHCLYDE GLASGOW IN SEPTEMBER 2017 ORGANIZED BY IMEKO TECHNICAL COMMITTEE 21 THE NATIONAL PHYSICAL LABORATORY UK AND THE UNIVERSITY OF STRATHCLYDE THE PAPERS PRESENT NEW MODELING APPROACHES ALGORITHMS AND COMPUTATIONAL METHODS FOR ANALYZING DATA FROM METROLOGY SYSTEMS AND FOR EVALUATION OF THE MEASUREMENT UNCERTAINTY AND DESCRIBE THEIR APPLICATIONS IN A WIDE RANGE OF MEASUREMENT AREAS THIS VOLUME IS USEFUL TO ALL RESEARCHERS ENGINEERS AND PRACTITIONERS WHO NEED TO CHARACTERIZE THE CAPABILITIES OF MEASUREMENT SYSTEMS AND EVALUATE MEASUREMENT DATA THROUGH THE PAPERS WRITTEN BY EXPERTS WORKING IN LEADING INSTITUTIONS IT COVERS THE LATEST COMPUTATIONAL APPROACHES AND DESCRIBES APPLICATIONS TO CURRENT MEASUREMENT CHALLENGES IN ENGINEERING ENVIRONMENT AND LIFE SCIENCES

NEW TRENDS AND DEVELOPMENTS IN METROLOGY 2016-07-20 INVESTIGATING THE INCESSANT TECHNOLOGY GROWTH AND THE EVEN HIGHER COMPLEXITY OF ENGINEERING SYSTEMS ONE OF THE CRUCIAL REQUIREMENTS TO CONFIDENTLY STEER BOTH SCIENTIFIC AND INDUSTRIAL CHALLENGES IS TO IDENTIFY AN APPROPRIATE MEASUREMENT APPROACH A GENERAL PROCESS CAN BE CONSIDERED EFFECTIVE AND UNDER CONTROL IF THE FOLLOWING ELEMENTS ARE CONSCIOUSLY AND CYCLICALLY MANAGED NUMERIC TARGET ADEQUATE TOOLS OUTPUT ANALYSIS AND CORRECTIVE ACTIONS THE ROLE OF METROLOGY IS TO RIGOROUSLY HARMONIZE THIS VIRTUOUS CIRCLE PROVIDING GUIDANCE IN TERMS OF INSTRUMENTS STANDARDS AND TECHNIQUES TO IMPROVE THE ROBUSTNESS AND THE ACCURACY OF THE RESULTS THIS BOOK IS DESIGNED TO OFFER AN INTERDISCIPLINARY EXPERIENCE INTO THE SCIENCE OF MEASUREMENT NOT ONLY COVERING HIGH LEVEL MEASUREMENT STRATEGIES BUT ALSO SUPPLYING ANALYTICAL DETAILS AND EXPERIMENTAL SETUPS

DATA MODELING FOR METROLOGY AND TESTING IN MEASUREMENT SCIENCE 2008-12-16 THIS BOOK PROVIDE A COMPREHENSIVE SET OF MODELING METHODS FOR DATA AND UNCERTAINTY ANALYSIS TAKING READERS BEYOND MAINSTREAM METHODS AND FOCUSING ON TECHNIQUES WITH A BROAD RANGE OF REAL WORLD APPLICATIONS THE BOOK WILL BE USEFUL AS A TEXTBOOK FOR GRADUATE

STUDENTS OR AS A TRAINING MANUAL IN THE FIELDS OF CALIBRATION AND TESTING THE WORK MAY ALSO SERVE AS A REFERENCE FOR METROLOGISTS MATHEMATICIANS STATISTICIANS SOFTWARE ENGINEERS CHEMISTS AND OTHER PRACTITIONERS WITH A GENERAL INTEREST IN MEASUREMENT SCIENCE

ELECTRICAL MOTOR PRODUCTS 2011-09-16 ELECTRICAL MOTOR PRODUCTS REVIEWS THE ENERGY EFFICIENCY MANAGEMENT LAWS FOR ELECTRICAL MOTOR PRODUCTS IN UNITED STATES EUROPEAN UNION EU AND CHINA THE ENERGY EFFICIENCY CERTIFICATION REQUIREMENTS FOR THE ELECTRICAL MOTOR PRODUCTS VARY FROM COUNTRY TO COUNTRY AND ARE SUMMARISED HERE INTERNATIONAL STANDARDS TESTING METHODS AND CERTIFICATION REQUIREMENTS FOR SPECIFIC ELECTRICAL MOTOR PRODUCTS ARE DISCUSSED INCLUDING ELECTRIC MOTORS PUMPS AND FANS FINALLY METHODS FOR IMPROVING ENERGY EFFICIENCY ARE EXAMINED REVIEWS THE ENERGY EFFICIENCY MANAGEMENT LAWS FOR ELECTRICAL MOTOR PRODUCTS IN UNITED STATES EUROPEAN UNION EU AND CHINA HIGHLIGHTS THE IMPORTANCE OF ENERGY EFFICIENCY FOR ELECTRICAL MOTOR PRODUCTS DOCUMENTS ENERGY EFFICIENCY CERTIFICATION REQUIREMENTS FOR ELECTRICAL MOTOR PRODUCTS AND HOW THEY VARY FROM COUNTRY TO COUNTRY

PERSON-CENTERED OUTCOME METROLOGY 2022-12-02 THIS UNIQUE COLLECTION OF CHAPTERS FROM WORLD EXPERTS ON PERSON CENTERED OUTCOME PCO MEASURES ADDRESSES THE FOLLOWING CRITICAL QUESTIONS CAN INDIVIDUAL EXPERIENCES BE REPRESENTED IN MEASUREMENTS THAT DO NOT REDUCE UNIQUE DIFFERENCES TO MEANINGLESS UNIFORMITY HOW PERSON CENTRIC ARE PCO MEASURES ARE PCO MEASUREMENTS CAPABLE OF DELIVERING THE KIND OF QUALITY ASSURED QUANTIFICATION REQUIRED FOR HIGH STAKES DECISION MAKING ARE PCO MEASURES LIKELY TO SUPPORT IMPROVED HEALTH CARE DELIVERY HAVE PIVOTAL CLINICAL STUDIES FAILED TO DELIVER TREATMENTS FOR DISEASES BECAUSE OF SHORTCOMINGS IN THE PCO MEASURES USED ARE THESE SHORTCOMINGS PRIMARILY MATTERS OF PRECISION AND MEANINGFULNESS OR IS THE LACK OF COMMON LANGUAGES FOR COMMUNICATING OUTCOMES ALSO DEBILITATING TO QUALITY IMPROVEMENT RESEARCH AND THE HEALTH CARE ECONOMY THREE KEY ISSUES FORM AN URGENT BASIS FOR FURTHER INVESTIGATION FIRST THE NUMBERS GENERATED BY PCO MEASURES ARE INCREASINGLY USED AS THE CENTRAL DEPENDENT VARIABLES UPON WHICH HIGH STAKES DECISIONS ARE MADE THE RISING PROFILE OF PCO MEASURES PLACES NEW DEMANDS FOR HIGHER QUALITY INFORMATION FROM SCALE AND TEST CONSTRUCTION EVALUATION SELECTION AND INTERPRETATION SECOND PCO MEASUREMENT SCIENCE HAS WELL ESTABLISHED LESSONS TO BE LEARNED FROM THOSE WHO HAVE BUILT AND ESTABLISHED THE SCIENCE OVER MANY DECADES FINALLY THE GOAL IN MAKING A PCO MEASUREMENT IS TO INFORM OUTCOME MANAGEMENT AS SUCH IT IS VITALLY IMPORTANT THAT KEY STAKEHOLDERS UNDERSTAND THAT OVER THE LAST HALF CENTURY DEVELOPMENTS IN PSYCHOMETRICS HAVE REFOCUSSED MEASUREMENT ON ILLUMINATING CLINICALLY IMPORTANT INDIVIDUAL DIFFERENCES IN THE CONTEXT OF WIDELY REPRODUCED PATTERNS OF VARIATION IN HEALTH AND FUNCTIONING COMPARABLE SCALE VALUES FOR QUALITY IMPROVEMENT AND PRACTICAL EXPLANATORY MODELS THIS BOOK S AUDIENCE INCLUDES ANYONE INTERESTED IN PERSON CENTERED CARE INCLUDING HEALTHCARE RESEARCHERS AND PRACTITIONERS POLICY MAKERS PHARMACEUTICAL INDUSTRY REPRESENTATIVES CLINICIANS PATIENT ADVOCATES AND METROLOGISTS THIS IS AN OPEN ACCESS BOOK

MEASUREMENT WITH PERSONS 2013-05-13 MEASUREMENTS WITH PERSONS ARE THOSE IN WHICH HUMAN PERCEPTION AND INTERPRETATION ARE USED FOR MEASURING COMPLEX HOLISTIC QUANTITIES AND QUALITIES WHICH ARE PERCEIVED BY THE HUMAN BRAIN AND MIND PROVIDING MEANS FOR REPRODUCIBLE MEASUREMENT OF PARAMETERS SUCH AS PLEASURE AND PAIN HAS IMPORTANT IMPLICATIONS IN EVALUATING ALL KIND OF PRODUCTS SERVICES AND CONDITIONS THIS BOOK INAUGURATES A NEW ERA FOR THIS SUBJECT A MULTI AND INTER DISCIPLINARY VOLUME IN WHICH WORLD RENOWNED SCIENTISTS FROM THE PSYCHOLOGICAL PHYSICAL BIOLOGICAL AND SOCIAL SCIENCES REACH A COMMON UNDERSTANDING OF MEASUREMENT THEORY AND METHODS IN THE FIRST SECTION GENERIC THEORETICAL AND METHODOLOGICAL ISSUES ARE TREATED INCLUDING THE CONCEPTUAL BASIS OF MEASUREMENT IN THE VARIOUS FIELDS INVOLVED THE DEVELOPMENT OF FORMAL REPRESENTATIONAL AND PROBABILISTIC THEORIES THE APPROACH TO EXPERIMENTATION AND THE THEORIES MODELS AND METHODS FOR MULTIDIMENSIONAL PROBLEMS IN THE SECOND SECTION SEVERAL IMPLEMENTATION AREAS ARE PRESENTED INCLUDING SOUND VISUAL SKIN AND ODOR PERCEPTION FUNCTIONAL BRAIN IMAGING BODY LANGUAGE AND EMOTIONS AND FINALLY THE USE OF MEASUREMENTS IN DECISION MAKING MEASUREMENT WITH PERSONS WILL APPEAL TO A WIDE AUDIENCE ACROSS A RANGE OF SCIENCES INCLUDING GENERAL PSYCHOLOGY AND PSYCHOPHYSICS MEASUREMENT THEORY METROLOGY AND INSTRUMENTATION NEUROPHYSIOLOGY ENGINEERING BIOLOGY AND CHEMISTRY

AUTOMATION 2018 2018-03-07 THIS BOOK CONSISTS OF PAPERS PRESENTED AT AUTOMATION 2018 AN INTERNATIONAL CONFERENCE HELD IN WARSAW FROM MARCH 21 TO 23 2018 IT DISCUSSES THE RADICAL TECHNOLOGICAL CHANGES OCCURRING DUE TO THE INDUSTRY 4.0 WITH A FOCUS ON OFFERING A BETTER UNDERSTANDING OF THE FOURTH INDUSTRIAL REVOLUTION EACH CHAPTER PRESENTS A DETAILED ANALYSIS OF INTERDISCIPLINARY KNOWLEDGE NUMERICAL MODELING AND SIMULATION AS WELL AS THE APPLICATION OF CYBER PHYSICAL SYSTEMS WHERE INFORMATION TECHNOLOGY AND PHYSICAL DEVICES CREATE SYNERGIC SYSTEMS LEADING TO UNPRECEDENTED EFFICIENCY THE THEORETICAL RESULTS PRACTICAL SOLUTIONS AND GUIDELINES PRESENTED ARE VALUABLE FOR BOTH RESEARCHERS WORKING IN THE AREA OF ENGINEERING SCIENCES AND PRACTITIONERS LOOKING FOR SOLUTIONS TO INDUSTRIAL PROBLEMS

CHALLENGES IN AUTOMATION, ROBOTICS AND MEASUREMENT TECHNIQUES 2016-02-15 THIS BOOK PRESENTS THE SET OF PAPERS ACCEPTED FOR PRESENTATION AT THE INTERNATIONAL CONFERENCE AUTOMATION HELD IN WARSAW 24 MARCH OF 2016 IT PRESENTS THE RESEARCH RESULTS PRESENTED BY TOP EXPERTS IN THE FIELDS OF INDUSTRIAL AUTOMATION CONTROL ROBOTICS AND MEASUREMENT TECHNIQUES EACH CHAPTER PRESENTS A THOROUGH ANALYSIS OF A SPECIFIC TECHNICAL PROBLEM WHICH IS USUALLY

FOLLOWED BY NUMERICAL ANALYSIS SIMULATION AND DESCRIPTION OF RESULTS OF IMPLEMENTATION OF THE SOLUTION OF A REAL WORLD PROBLEM THE PRESENTED THEORETICAL RESULTS PRACTICAL SOLUTIONS AND GUIDELINES WILL BE VALUABLE FOR BOTH RESEARCHERS WORKING IN THE AREA OF ENGINEERING SCIENCES AND FOR PRACTITIONERS SOLVING INDUSTRIAL PROBLEMS

ADVANCED MATHEMATICAL AND COMPUTATIONAL TOOLS IN METROLOGY AND TESTING IX 2012 THIS VOLUME CONTAINS ORIGINAL REFEREED WORLDWIDE CONTRIBUTIONS THEY WERE PROMPTED BY PRESENTATIONS MADE AT THE NINTH AMCTM CONFERENCE HELD IN GOTEBOG SWEDEN IN JUNE 2011 ON THE THEME OF ADVANCED MATHEMATICAL AND COMPUTATIONAL TOOLS IN METROLOGY AND ALSO IN THE TITLE OF THIS BOOK SERIES IN TESTING THE THEMES IN THIS VOLUME REFLECT THE IMPORTANCE OF THE MATHEMATICAL STATISTICAL AND NUMERICAL TOOLS AND TECHNIQUES IN METROLOGY AND TESTING AND ALSO IN KEEPING THE CHALLENGE PROMOTED BY THE METRE CONVENTION TO ACCESS A MUTUAL RECOGNITION FOR THE MEASUREMENT STANDARDS

ANNUAL HISTORICAL REVIEW 1987 THIS CONTRIBUTED BOOK FOCUSES ON MAJOR ASPECTS OF STATISTICAL QUALITY CONTROL SHARES INSIGHTS INTO IMPORTANT NEW DEVELOPMENTS IN THE FIELD AND ADAPTS ESTABLISHED STATISTICAL QUALITY CONTROL METHODS FOR USE IN E G BIG DATA NETWORK ANALYSIS AND MEDICAL APPLICATIONS THE CONTENT IS DIVIDED INTO TWO PARTS THE FIRST OF WHICH MAINLY ADDRESSES STATISTICAL PROCESS CONTROL ALSO KNOWN AS STATISTICAL PROCESS MONITORING IN TURN THE SECOND PART EXPLORES SELECTED TOPICS IN STATISTICAL QUALITY CONTROL INCLUDING MEASUREMENT UNCERTAINTY ANALYSIS AND DATA QUALITY THE PEER REVIEWED CONTRIBUTIONS GATHERED HERE WERE ORIGINALLY PRESENTED AT THE 13TH INTERNATIONAL WORKSHOP ON INTELLIGENT STATISTICAL QUALITY CONTROL ISQC 2019 HELD IN HONG KONG ON AUGUST 12 14 2019 TAKEN TOGETHER THEY BRIDGE THE GAP BETWEEN THEORY AND PRACTICE MAKING THE BOOK OF INTEREST TO BOTH PRACTITIONERS AND RESEARCHERS IN THE FIELD OF STATISTICAL QUALITY CONTROL

FRONTIERS IN STATISTICAL QUALITY CONTROL 13 2021-05-15 IT IS NOW BECOMING RECOGNIZED IN THE MEASUREMENT COMMUNITY THAT IT IS AS IMPORTANT TO COMMUNICATE THE UNCERTAINTY RELATED TO A SPECIFIC MEASUREMENT AS IT IS TO REPORT THE MEASUREMENT ITSELF WITHOUT KNOWING THE UNCERTAINTY IT IS IMPOSSIBLE FOR THE USERS OF THE RESULT TO KNOW WHAT CONFIDENCE CAN BE PLACED IN IT IT IS ALSO IMPOSSIBLE TO ASSESS THE COMPARABILITY OF DIFFERENT MEASUREMENTS OF THE SAME PARAMETER THIS VOLUME COLLECTS 20 OUTSTANDING PAPERS ON THE TOPIC MOSTLY PUBLISHED FROM 1999 2002 IN THE JOURNAL ACCREDITATION AND QUALITY ASSURANCE THEY PROVIDE THE RATIONALE FOR WHY IT IS IMPORTANT TO EVALUATE AND REPORT THE UNCERTAINTY OF A RESULT IN A CONSISTENT MANNER THEY ALSO DESCRIBE THE CONCEPT OF UNCERTAINTY THE METHODOLOGY FOR EVALUATING UNCERTAINTY AND THE ADVANTAGES OF USING SUITABLE REFERENCE MATERIALS FINALLY THE BENEFITS TO BOTH THE ANALYTICAL LABORATORY AND THE USER OF THE RESULTS ARE CONSIDERED

SENSORFUSION ZUR KOMPENSATION VON MESSFEHLERN BEI KAMERABASIERTER FARBVERTEILUNGSMESSUNG 2018-11-15 THIS BOOK CONTAINS 38 PAPERS AUTHORED BY BOTH SCIENTISTS AND PRACTITIONERS FOCUSED ON AN INTERDISCIPLINARY APPROACH TO THE DEVELOPMENT OF CYBER PHYSICAL SYSTEMS RECENTLY OUR CIVILIZATION HAS BEEN FACING ONE OF THE MOST SEVERE CHALLENGES IN MODERN HISTORY THE COVID 19 PANDEMIC DEVASTATED THE GLOBAL ECONOMY AND SIGNIFICANTLY DISRUPTED NUMEROUS AREAS OF ECONOMIC ACTIVITY ONLY RADICAL INCREASE OF EFFICIENCY AND VERSATILITY OF INDUSTRIAL PRODUCTION WITH FURTHER LIMITATION OF HUMAN INVOLVEMENT PARALLELED BY THE DECREASE OF ENVIRONMENTAL BURDEN WILL ENABLE US TO COPE WITH SUCH CHALLENGES WE HOPE THAT THE PRESENTED BOOK PROVIDES INPUT TO THE SOLUTION OF AT LEAST SOME PROBLEMS BROUGHT ABOUT BY THIS CHALLENGE THIS APPROACH RELIES ON THE DEVELOPMENT OF MEASURING TECHNIQUES ROBOTIC AND MECHATRONIC SYSTEMS INDUSTRIAL AUTOMATION NUMERICAL MODELING AND SIMULATION AS WELL AS APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNIQUES REQUIRED BY THE TRANSFORMATION LEADING TO INDUSTRY 4 0

MEASUREMENT UNCERTAINTY IN CHEMICAL ANALYSIS 2013-06-29 THIS BOOK PRESENTS A GENERAL AND COMPREHENSIVE FRAMEWORK FOR THE ASSURANCE OF QUALITY IN MEASUREMENTS WRITTEN BY A FOREMOST EXPERT IN THE FIELD THE TEXT REFLECTS AN ON GOING INTERNATIONAL EFFORT TO EXTEND TRADITIONAL QUALITY ASSURED MEASUREMENT ROOTED IN FUNDAMENTAL PHYSICS AND THE SI TO INCLUDE NON PHYSICAL AREAS SUCH AS PERSON CENTRED CARE AND THE SOCIAL SCIENCES MORE GENERALLY CHAPTER BY CHAPTER THE BOOK FOLLOWS THE MEASUREMENT QUALITY ASSURANCE LOOP BASED ON DEMING S WORK THE AUTHOR ENHANCES THIS QUALITY ASSURANCE CYCLE WITH INSIGHTS FROM RECENT RESEARCH INCLUDING WORK ON THE POLITICS AND PHILOSOPHY OF METROLOGY THE NEW SI QUANTITATIVE AND QUALITATIVE SCALES AND ENTROPY DECISION RISKS AND UNCERTAINTY WHEN ADDRESSING HUMAN CHALLENGES MAN AS A MEASUREMENT INSTRUMENT AND PSYCHOMETRY AND PERSON CENTRED CARE QUALITY ASSURED MEASUREMENT UNIFICATION ACROSS SOCIAL AND PHYSICAL SCIENCES PROVIDES STUDENTS AND RESEARCHERS IN PHYSICS CHEMISTRY ENGINEERING MEDICINE AND THE SOCIAL SCIENCES WITH PRACTICAL GUIDANCE ON DESIGNING IMPLEMENTING AND APPLYING A QUALITY ASSURED MEASUREMENT WHILE ENGAGING READERS IN THE MOST NOVEL AND EXPANSIVE AREAS OF CONTEMPORARY MEASUREMENT RESEARCH

AUTOMATION 2021: RECENT ACHIEVEMENTS IN AUTOMATION, ROBOTICS AND MEASUREMENT TECHNIQUES 2021-04-29 ADVANCES IN METROLOGY DEPEND ON IMPROVEMENTS IN SCIENTIFIC AND TECHNICAL KNOWLEDGE AND IN INSTRUMENTATION QUALITY AS WELL AS BETTER USE OF ADVANCED MATHEMATICAL TOOLS AND DEVELOPMENT OF NEW ONES IN THIS VOLUME SCIENTISTS FROM BOTH THE MATHEMATICAL AND THE METROLOGICAL FIELDS EXCHANGE THEIR EXPERIENCES INDUSTRIAL SECTORS SUCH AS INSTRUMENTATION AND SOFTWARE ARE LIKELY TO BENEFIT FROM THIS EXCHANGE SINCE METROLOGY HAS A HIGH IMPACT ON THE OVERALL QUALITY OF INDUSTRIAL PRODUCTS AND APPLIED MATHEMATICS IS BECOMING MORE AND MORE IMPORTANT IN INDUSTRIAL

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