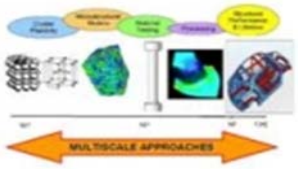
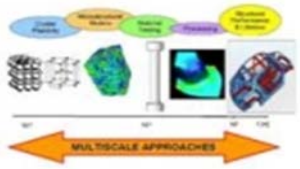


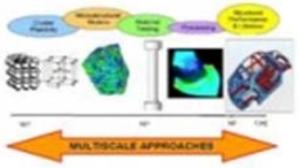
MODELAREA CONTINUA -DE LA MICRO LA MACRO SCARA- A MATERIALELOR AVANSATE IN FABRICATIA VIRTUALA
-PCCE 100-
www.comod.utcluj.ro

Director proiect
Prof.dr.ing. Dorel BANABIC
Universitatea Tehnica din Cluj Napoca



- **Introducere**
- **Obiectivele proiectului**
- **Rezultate semnificative obtinute**
- **Echipamente achizitionate**
- **Criteriile minime de performanta. Diseminare**
- **Impactul rezultatelor obtinute**
- **Pagina de web a proiectului**

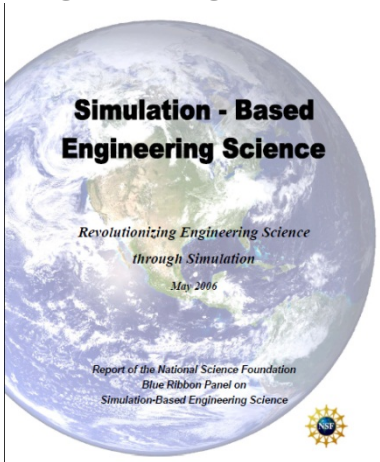
Structura prezentarii



Simulation Based Engineering Science

Using multiscale modeling to invigorate engineering design with science

NSF Initiative

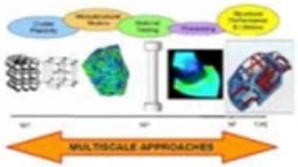


Max-Planck Multiscale Modeling Initiative

Initiative pe plan mondial

UNIVERSITATEA TEHNICĂ
DIN CLUJ-NAPOCA

MODELAREA CONTINUA -DE LA MICRO LA MACRO SCARA- A MATERIALELOR AVANSATE IN FABRICATIA VIRTUALA



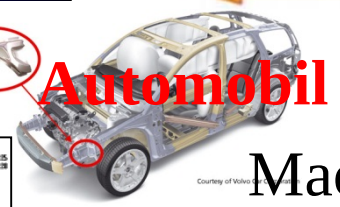
Timp

s

ms

µs

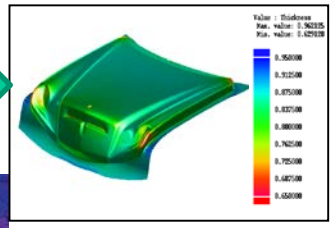
ns



Automobil

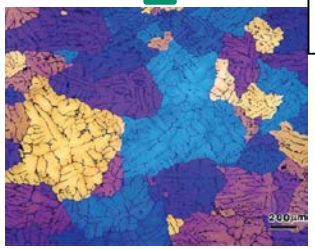
Produs final

Macro

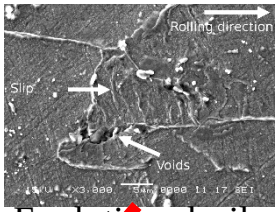


Simulare MEF

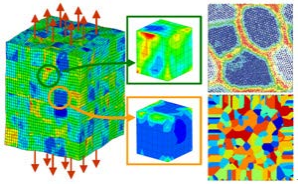
Mezo



Analiza de Textura

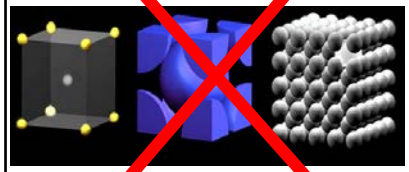


Evolutia golurilor



Plasticitatea cristalelor

Micro



Atom

Nivel atomic

Nano

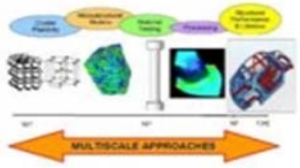
nm

µm

mm

m

Lungime

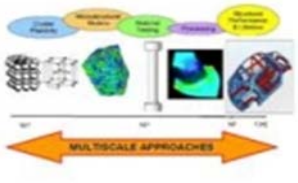


- Introducere

- **Obiectivele proiectului**

- **Rezultate semnificative obtinute**
- **Echipamente achizitionate**
- **Criteriile minime de performanta. Diseminare**
- **Impactul rezultatelor obtinute**
- **Pagina de web a proiectului**

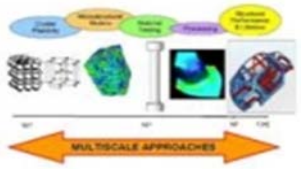
Structura prezentarii



Obiectivul principal: de a elabora modele de material la nivel microscopic şi de a le implementa în programe de simulare ale unor procese de deformare la nivel macroscopic

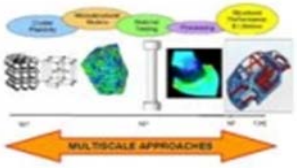
1. **Caracterizarea experimentală la nivel micro şi macro a aliajelor selectate**
2. **Modelarea la nivel micro şi macroscopic a comportării materialelor testate**
3. **Implementarea modelelor elaborate în programe de calcul**
4. **Validarea rezultatelor simularii unor procese de deformare**

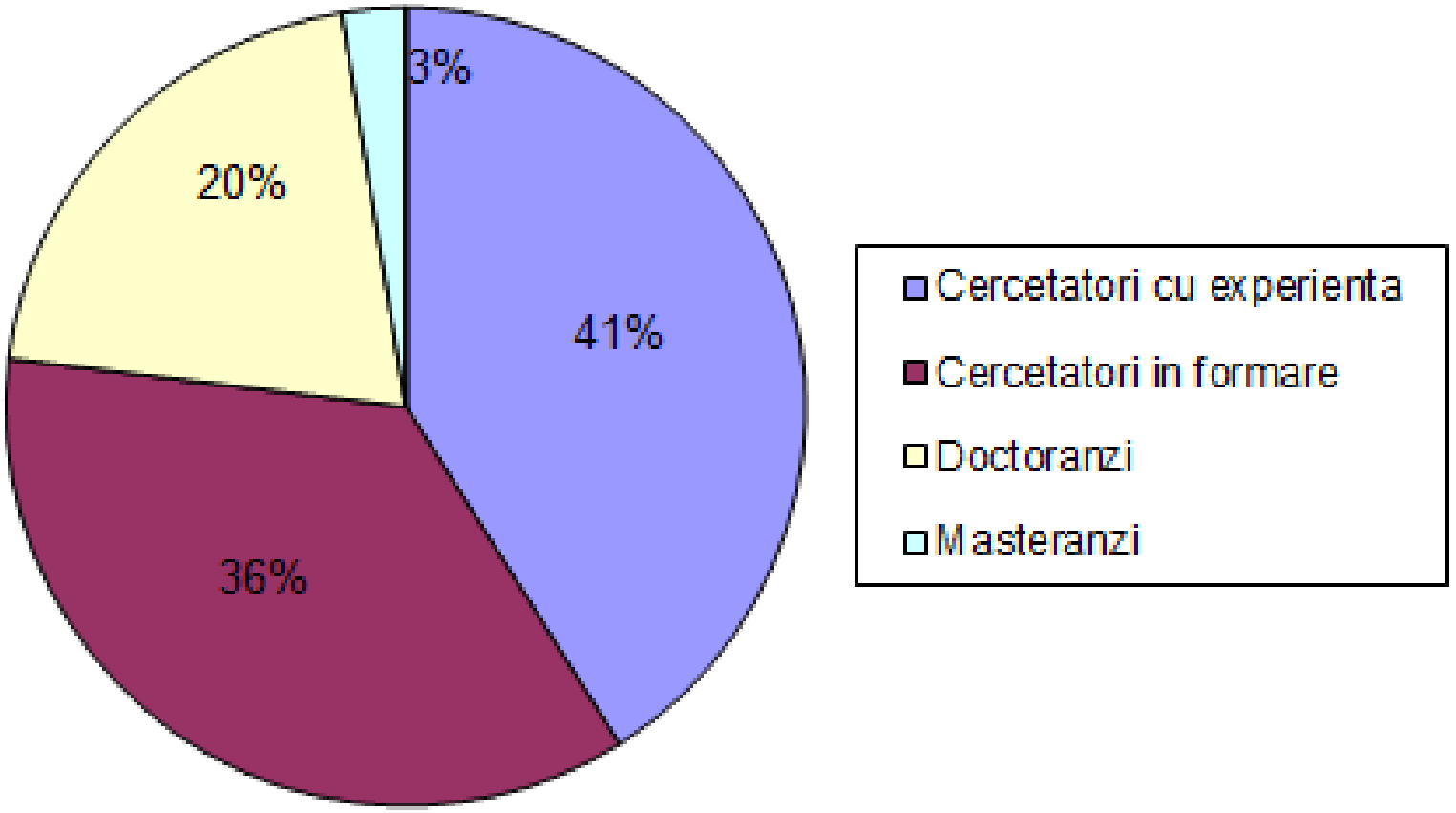
Obiectivele proiectului



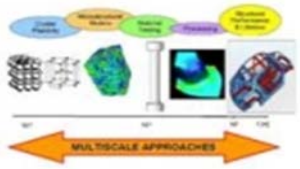
Calitatea echipei de cercetare	Denumire institutie; Denumire centru de cercetare/ laborator/ grup de cercetare
Partener 1	UNIVERSITATEA TEHNICA DIN CLUJ-NAPOCA **CENTRU DE CERCETARE IN TEHNOLOGIA DEFORMARII TABLELOR - CERTETA**
Partener 2	UNIVERSITATEA TEHNICA DIN CLUJ-NAPOCA **LABORATOR DE MICROSCOPIE ELECTRONICA**
Partener 3	UNIVERSITATEA TEHNICA DIN CLUJ-NAPOCA **LABORATOR DE STIINTA MATERIALELOR- FILME SUBTIRI**
Partener 4	UNIVERSITATEA TEHNICA DIN CLUJ-NAPOCA **CENTRUL DE CERCETARE IN PRELUCRAREA IMAGINILOR SI RECUNOASTEREA FORMELOR**
Partener 5	INSTITUTUL DE MATEMATICA SIMION STOILOV AL ACADEMIEI ROMANE
Partener 6	UNIVERSITATEA DIN BUCURESTI **CENTRUL DE CERCETARE IN MECANICA MEDIILOR CONTINUE**

Partenerii consortiului



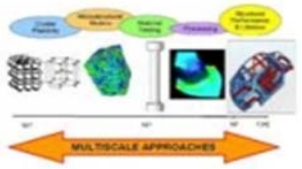


Resursa umane implicata in proiect



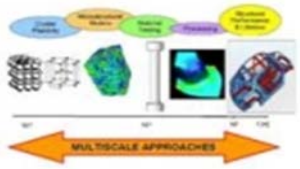
- Introducere
- Obiectivele proiectului
- **Rezultate semnificative obtinute**
- **Echipamente achizitionate**
- **Criteriile minime de performanta. Diseminare**
- **Impactul rezultatelor obtinute**
- **Pagina de web a proiectului**

Structura prezentarii

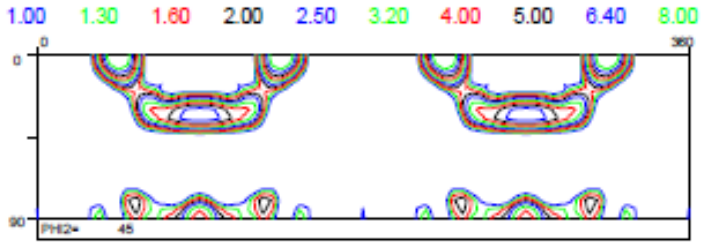


1. Cuplarea modelului BBC 2008 cu modelul de plasticitate cristalina ALAMEL pentru predictia evolutiei texturii in timpul proceselor de deformare plastica
2. Elaborarea unor modele de tip Gurson avansat pentru materiale anizotrope cu goluri (Cuplarea modelului Gologanu cu modelul BBC 2008)

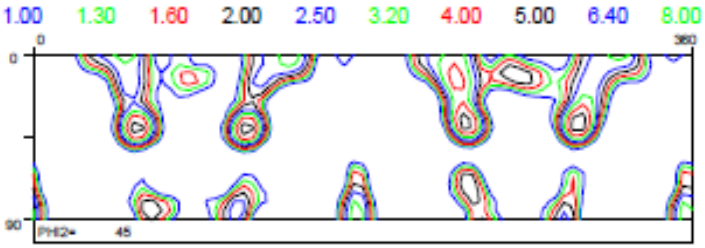
Rezultate semnificative obtinute



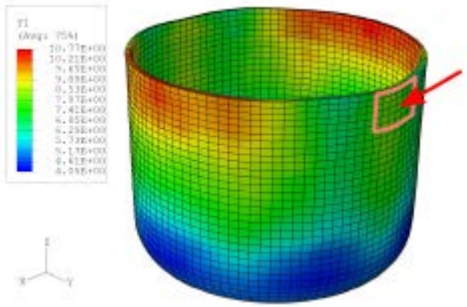
Materialul testat: AA1050

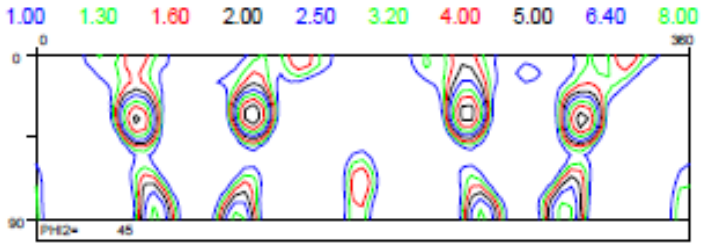


Textura initiala a materialului



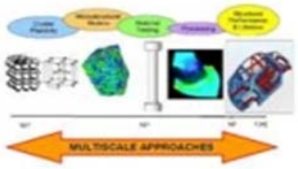
Textura masurata in piesa ambutisata





Textura prezisa utilizind modelul BBC 2008

Exemplu de predictie a texturii utilizind modelul ALAMEL cuplat cu BBC2008



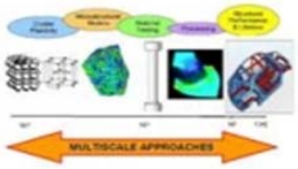
PUTEM PREZICE CU ACURATETE FORMA SI PARAMETRII MECANICI AI PIESELOR LA SCARA MACROSCOPICA PORNIND DE LA PARAMETRII MICROSCOPICI (TEXTURA)

ALAMEL (PLASTICITATE CRISTALINA)

+

BBC 2008 (MODEL FENOMENOLOGIC)

Contractarea cu firma AUTOFORM pentru implementarea cuplajului in programul commercial AutoForm R5

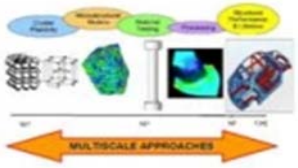


PUTEM PREZICE CU ACURATETE DEFECTELE PIESELOR LA SCARA MACROSCOPICA PORNIND DE LA PARAMETRII MICROSCOPICI (GOLURI)

GOLOGANU (MODEL DE EVOLUTIE AL GOLURILOR)

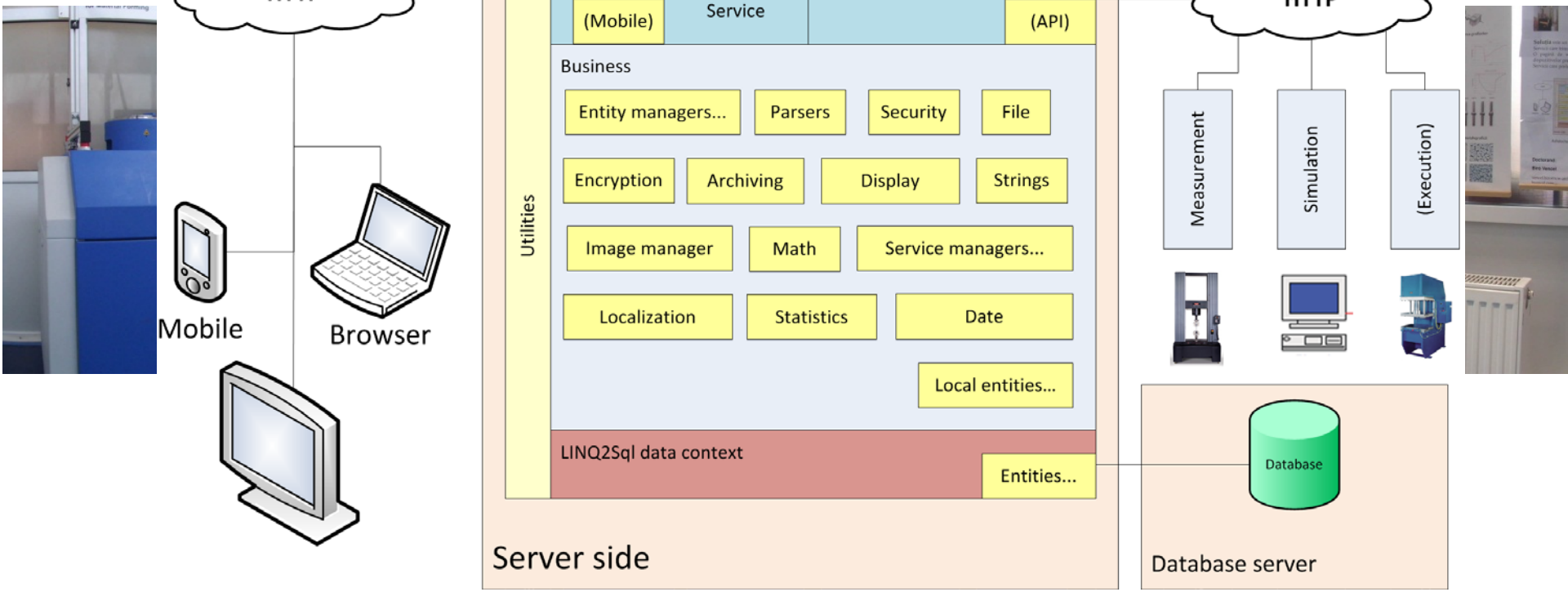
+

BBC 2008 (MODEL FENOMENOLOGIC)

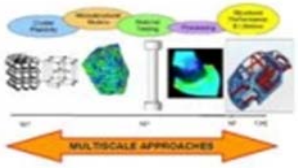


- Introducere
- Obiectivele proiectului
- Planul de realizare al proiectului
- Rezultate semnificative obtinute
- **Echipamente achizitionate**
- **Criteriile minime de performanta. Diseminare**
- **Impactul rezultatelor obtinute**
- **Pagina de web a proiectului**

Structura prezentarii

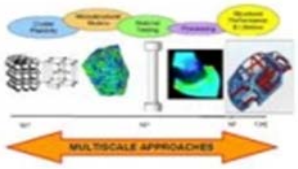


Echipamentele de cercetare din dotarea laboratorului centrului CERTETA



- Introducere
- Obiectivele proiectului
- Planul de realizare al proiectului
- Rezultate semnificative obtinute
- Echipamente achizitionate
- **Criteriile minime de performanta. Diseminare**
- **Impactul rezultatelor obtinute**
- **Pagina de web a proiectului**

Structura prezentarii



Criterii minime de performanta :

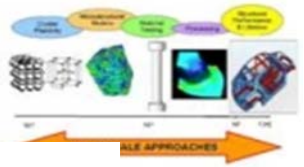
An	Număr de articole acceptate spre publicare în reviste indexate ISI		Număr de articole acceptate spre publicare în reviste indexate în baze de date internaţionale	
	Propus	Realizat	Propus	Realizat
2010	4	4	2	5
2011	6	6	8	4
2012	8	10	9	2
2013	3	6+11	4	0
TOTAL	**21**	**26+11=37**	**23**	**11**

***Scorul Relativ de Influenta* cumulat al articolelor publicate si acceptate este de aprox. 68.**

S-au publicat :
***11 articole* in reviste cu factor de impact ridicat, din *zona rosie* (MMT-A, European Journal of Mechanics-A…)**
7 articole* …. din *zona galbena

UNIVERSITATEA TEHNICĂ DIN CLUJ-NAPOCA

MODELAREA CONTINUA -DE LA MICRO LA MACRO SCARA- A MATERIALELOR AVANSATE IN FABRICATIA VIRTUALA

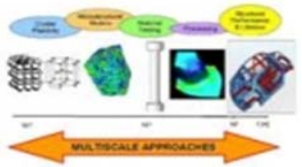


Lista revistelor incadrate pe subdomenii, ordonate in functie de scorul de influenta al acestora (AIS)
Indexate in Science Citation Index Expanded Social Sciences Citation Index

Categorie	Subdomeniu ISI	Revista *(revistele marcate cu (*) au acelasi punctaj ca si revista anterioara)*	ISSN	Zona	top
Science	MEDICINE, RESEARCH & EXPERIMENTAL	J INT MED RES	0300-0605	3	80
Science	MEDICINE, RESEARCH & EXPERIMENTAL	ACTA MED OKAYAMA	0386-300X	3	81
Science	MEDICINE, RESEARCH & EXPERIMENTAL	UNDERSEA HYPERBAR M	1066-2936	3	82
Science	MEDICINE, RESEARCH & EXPERIMENTAL	ALTEX-ALTERN ANIM EX	1868-596X	3	83
Science	MEDICINE, RESEARCH & EXPERIMENTAL	GENET COUNSEL	1015-8146	3	84
Science	MEDICINE, RESEARCH & EXPERIMENTAL	WIRES SYST BIOL MED	1939-5094	3	85
Science	MEDICINE, RESEARCH & EXPERIMENTAL	J CARDIOVASC TRANSL	1937-5387	3	86
Science	MEDICINE, RESEARCH & EXPERIMENTAL	CURR THER RES CLIN E	0011-393X	3	87
Science	MEDICINE, RESEARCH & EXPERIMENTAL	M S-MED SCI	0767-0974	3	88
Science	MEDICINE, RESEARCH & EXPERIMENTAL	MOL MED REP	1791-2997	3	89
Science	MEDICINE, RESEARCH & EXPERIMENTAL	ANN BIOL CLIN-PARIS	0003-3898	3	90
Science	MEDICINE, RESEARCH & EXPERIMENTAL	B EXP BIOL MED+	0007-4888	3	91
Science	MEDICINE, RESEARCH & EXPERIMENTAL	ASIAN BIOMED	1905-7415	3	92
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**ACTA MATER**	**1359-6454**	**1**	**1**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**SCRIPTA MATER**	**1359-6462**	**1**	**2**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**METALL MATER TRANS A**	**1073-5623**	**1**	**3**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**INTERMETALLICS**	**0966-9795**	**1**	**4**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**CORROS SCI**	**0010-938X**	**1**	**5**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**PHILOS MAG**	**1478-6435**	**1**	**6**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**JOM-US**	**1047-4838**	**1**	**7**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**INT J REFRACT MET H**	**0263-4368**	**1**	**8**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**J ALLOY COMPD**	**0925-8388**	**1**	**9**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**HYDROMETALLURGY**	**0304-386X**	**1**	**10**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**MINER PROCESS EXTR M**	**0882-7508**	**1**	**11**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**SCI TECHNOL WELD JOI**	**1362-1718**	**1**	**12**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**METALL MATER TRANS B**	**1073-5615**	**1**	**13**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**OXID MET**	**0030-770X**	**1**	**14**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**ISIJ INT**	**0915-1559**	**1**	**15**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**INT J MATER RES**	**1862-5282**	**1**	**16**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**MATER SCI TECH-LOND**	**0267-0836**	**1**	**17**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**CORROSION**	**0010-9312**	**2**	**18**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**MATER TRANS**	**1345-9678**	**2**	**19**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**MET MATER INT**	**1598-9623**	**2**	**20**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**POWDER METALL**	**0032-5899**	**2**	**21**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**J MATER SCI TECHNOL**	**1005-0302**	**2**	**22**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**MATER CORROS**	**0947-5117**	**2**	**23**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**STEEL RES INT**	**1611-3683**	**2**	**24**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**IRONMAK STEELMAK**	**0301-9233**	**2**	**25**
Science	**METALLURGY & METALLURGICAL ENGINEERING**	**J UNIV SCI TECHNOL B**	**1005-8850**	**2**	**26**
Science	METALLURGY & METALLURGICAL ENGINEERING	RARE METAL MAT ENG	1002-185X	3	66
Science	METALLURGY & METALLURGICAL ENGINEERING	STAHL EISEN	0340-4803	3	67

UNIVERSITATEA TEHNICĂ
DIN CLUJ-NAPOCA

MODELAREA CONTINUA -DE LA MICRO LA MACRO SCARA- A MATERIALELOR AVANSATE IN FABRICATIA VIRTUALA

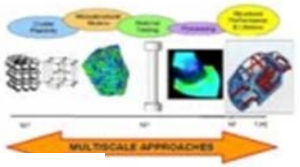


Lista revistelor incadrate pe subdomenii, ordonate in functie de scorul de influenta al acestora (AIS)
Indexate in Science Citation Index Expanded Social Sciences Citation Index

Subdomeniu ISI	Revista *(revistele marcate cu (*) au acelasi punctaj ca si revista anterioara)*	ISSN	Tara	Zona	top
Engineering, marine	JOURNAL OF MARINE SCIENCE AND TECHNOLOGY	0948-4280	JAPAN	1	2
Engineering, marine	JOURNAL OF SHIP RESEARCH	0022-4502	UNITED STATES	2	3
Engineering, marine	JOURNAL OF NAVIGATION	0373-4633	ENGLAND	3	4
Engineering, marine	NAVAL ENGINEERS JOURNAL	0028-1425	UNITED STATES	3	5
Engineering, mechanical	PROGRESS IN ENERGY AND COMBUSTION SCIENCE	0360-1285	ENGLAND	1	1
Engineering, mechanical	ADVANCES IN APPLIED MECHANICS	0065-2156	UNITED STATES	1	2
Engineering, mechanical	INTERNATIONAL JOURNAL OF PLASTICITY	0749-6419	ENGLAND	1	3
Engineering, mechanical	PROCEEDINGS OF THE COMBUSTION INSTITUTE	1540-7489	UNITED STATES	1	4
Engineering, mechanical	JOURNAL OF MICROELECTROMECHANICAL SYSTEMS	1057-7157	UNITED STATES	1	5
Engineering, mechanical	PROBABILISTIC ENGINEERING MECHANICS	0266-8920	ENGLAND	1	6
Engineering, mechanical	EXPERIMENTS IN FLUIDS	0723-4864	GERMANY	1	7
Engineering, mechanical	INTERNATIONAL JOURNAL OF HEAT AND FLUID FLOW	0142-727X	UNITED STATES	1	8
Engineering, mechanical	INTERNATIONAL JOURNAL OF HEAT AND MASS TRANSFER	0017-9310	ENGLAND	1	9
Engineering, mechanical	INTERNATIONAL JOURNAL OF THERMAL SCIENCES	1290-0729	FRANCE	1	10
Engineering, mechanical	JOURNAL OF FLUIDS AND STRUCTURES	0889-9746	ENGLAND	1	11
Engineering, mechanical	MECHANICAL SYSTEMS AND SIGNAL PROCESSING	0888-3270	ENGLAND	1	12
Engineering, mechanical	JOURNAL OF ENGINEERING MECHANICS-ASCE	0733-9399	UNITED STATES	1	13
Engineering, mechanical	INTERNATIONAL JOURNAL OF MECHANICAL SCIENCES	0020-7403	ENGLAND	1	14
Engineering, mechanical	TRIBOLOGY INTERNATIONAL	0301-679X	ENGLAND	1	15
Engineering, mechanical	INTERNATIONAL JOURNAL OF FATIGUE	0142-1123	ENGLAND	1	16
Engineering, mechanical	JOURNAL OF ENGINEERING MATERIALS AND TECHNOLOGY-TRANSACTIONS OF THE ASME	0094-4289	UNITED STATES	1	17
Engineering, mechanical	WEAR	0043-1648	SWITZERLAND	1	18
Engineering, mechanical	NONLINEAR DYNAMICS	0924-090X	UNITED STATES	1	19
Engineering, mechanical	NANOSCALE AND MICROSCALE THERMOPHYSICAL ENGINEERING	1556-7265	UNITED STATES	1	20
Engineering, mechanical	TRIBOLOGY LETTERS	1023-8883	UNITED STATES	1	21
Engineering, mechanical	JOURNAL OF HYDRAULIC ENGINEERING-ASCE	0733-9429	UNITED STATES	1	22
Engineering, mechanical	INTERNATIONAL JOURNAL OF IMPACT ENGINEERING	0734-743X	ENGLAND	1	23
Engineering, mechanical	WIND ENERGY	1095-4244	ENGLAND	1	24
Engineering, mechanical	INTERNATIONAL JOURNAL OF MACHINE TOOLS & MANUFACTURE	0890-6955	ENGLAND	1	25
Engineering, mechanical	EXPERIMENTAL THERMAL AND FLUID SCIENCE	0894-1777	UNITED STATES	1	26
Engineering, mechanical	IEEE-ASME TRANSACTIONS ON MECHATRONICS	1083-4435	UNITED STATES	2	27
Engineering, mechanical	APPLIED THERMAL ENGINEERING	1359-4311	ENGLAND	2	28
Engineering, mechanical	JOURNAL OF SOUND AND VIBRATION	0022-460X	UNITED STATES	2	29
Engineering, mechanical	INTERNATIONAL JOURNAL OF REFRIGERATION-REVUE INTERNATIONALE DU FROID	0140-7007	ENGLAND	2	30
Engineering, mechanical	FATIGUE & FRACTURE OF ENGINEERING MATERIALS & STRUCTURES	8756-758X	ENGLAND	2	31
Engineering, mechanical	JOURNAL OF HEAT TRANSFER-TRANSACTIONS OF THE ASME	0022-1481	UNITED STATES	2	32
Engineering, mechanical	TRIBOLOGY & LUBRICATION TECHNOLOGY	1545-858X	UNITED STATES	3	100
Engineering, mechanical	BWK	1618-193X	GERMANY	3	101

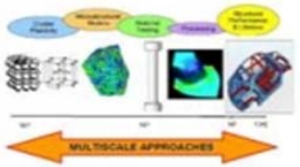
UNIVERSITATEA TEHNICĂ
DIN CLUJ-NAPOCA

MODELAREA CONTINUA -DE LA MICRO LA MACRO SCARA- A MATERIALELOR AVANSATE IN FABRICATIA VIRTUALA



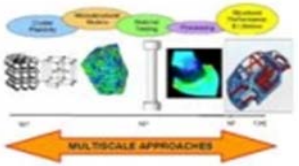
Lista revistelor incadrate pe subdomenii, ordonate in functie de scorul de influenta al acestora (AIS)
Indexate in Science Citation Index Expanded Social Sciences Citation Index

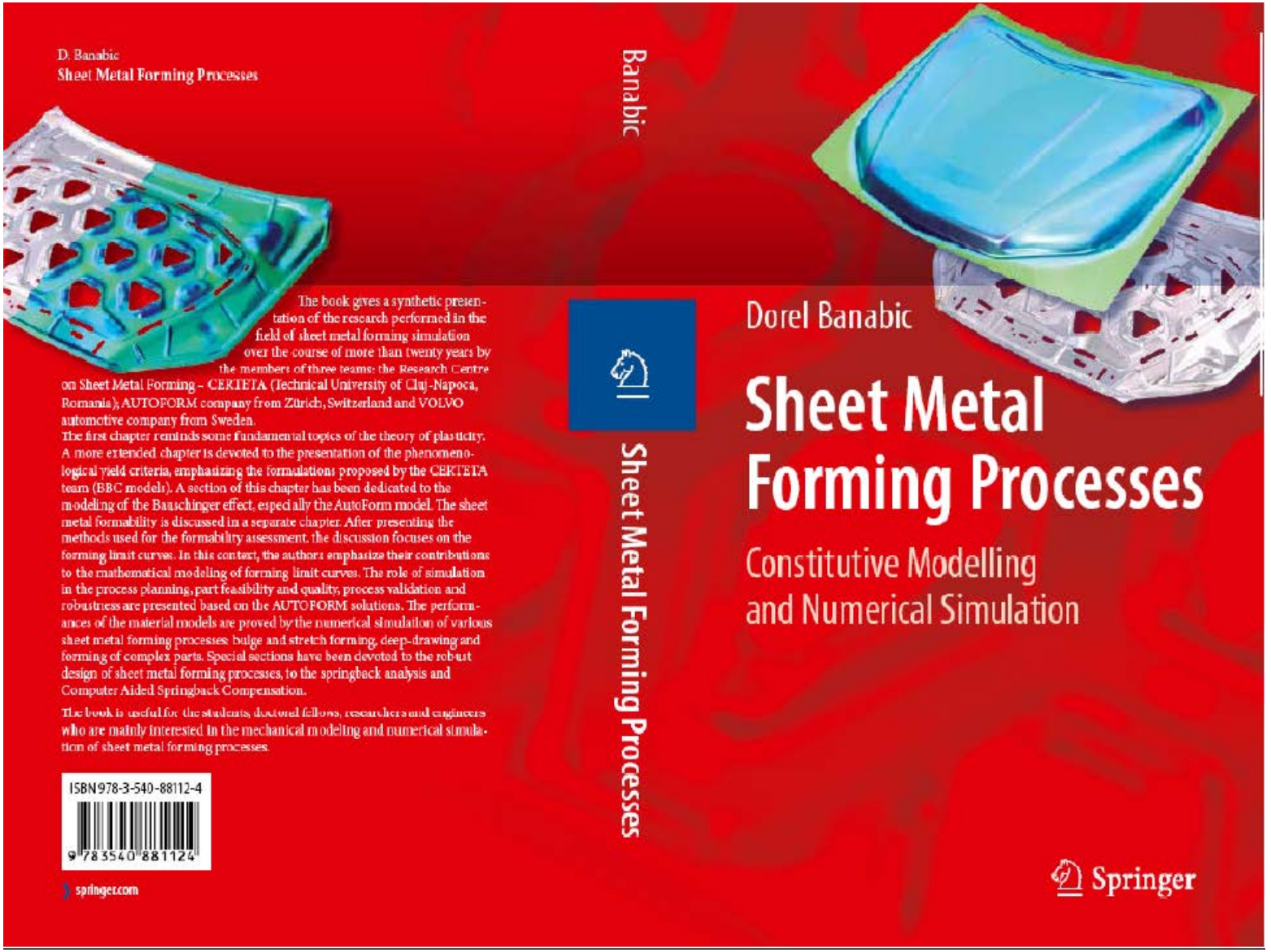
Categorie	Subdomeniu ISI	Revista *(revistele marcate cu (*) au acelasi punctaj ca si revista anterioara)*	ISSN	Zona	top
Science	CLINICAL NEUROLOGY	FORTSCHR NEUROL PSYC	0720-4299	3	143
Science	CLINICAL NEUROLOGY	NEUROLOGIA	0213-4853	3	144
Science	CLINICAL NEUROLOGY	CENT EUR NEUROSURG	0044-4251	3	145
Science	CLINICAL NEUROLOGY	NEURO-OPHTHALMOLOGY	0165-8107	3	146
Science	CLINICAL NEUROLOGY	INTERV NEURORADIOL	1123-9344	3	147
Science	CLINICAL NEUROLOGY	NERVENHEILKUNDE	0722-1541	3	148
Science	CLINICAL NEUROLOGY	AKTUEL NEUROL	0302-4350	3	149
Science	CLINICAL NEUROLOGY	KLIN NEUROPHYSIOL	1434-0275	3	150
Science	CLINICAL NEUROLOGY	ZH NEVROL PSIKHIATR	1997-7298	3	151
Science	CLINICAL NEUROLOGY	NEUROL CROATICA	0353-8842	3	152
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**IEEE T PATTERN ANAL**	**0162-8828**	**1**	**1**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**SIAM J IMAGING SCI**	**1936-4954**	**1**	**2**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**INT J COMPUT VISION**	**0920-5691**	**1**	**3**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**J MACH LEARN RES**	**1532-4435**	**1**	**4**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**IEEE T IMAGE PROCESS**	**1057-7149**	**1**	**5**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**COMPUT LINGUIST**	**0891-2017**	**1**	**6**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**IEEE T EVOLUT COMPUT**	**1089-778X**	**1**	**7**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**MED IMAGE ANAL**	**1361-8415**	**1**	**8**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**MACH LEARN**	**0885-6125**	**1**	**9**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**J WEB SEMANT**	**1570-8268**	**1**	**10**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**EVOL COMPUT**	**1063-6560**	**1**	**11**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**COMPUT VIS IMAGE UND**	**1077-3142**	**1**	**12**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**IEEE T KNOWL DATA EN**	**1041-4347**	**1**	**13**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**NEURAL COMPUT**	**0899-7667**	**1**	**14**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**ARTIF INTELL**	**0004-3702**	**1**	**15**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**DATA MIN KNOWL DISC**	**1384-5810**	**1**	**16**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**IEEE T SYST MAN CY B**	**1083-4419**	**1**	**17**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**PATTERN RECOGN**	**0031-3203**	**1**	**18**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**IEEE T NEURAL NETWOR**	**1045-9227**	**1**	**19**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**IEEE COMPUT INTELL M**	**1556-603X**	**1**	**20**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**IEEE T FUZZY SYST**	**1063-6706**	**1**	**21**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**J ARTIF INTELL RES**	**1076-9757**	**1**	**22**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**NEURAL NETWORKS**	**0893-6080**	**1**	**23**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**J HEURISTICS**	**1381-1231**	**1**	**24**
Science	**COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE**	**J MATH IMAGING VIS(*)**	**0924-9907**	**1**	**25**
Science	COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE	IEEE INTELL SYST	1541-1672	2	26
Science	COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE	NETWORK-COMP NEURAL	0954-898X	2	27
Science	COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE	ACM T AUTON ADAP SYS	1556-4665	2	28
Science	COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE	IEEE T SYST MAN CY C	1094-6977	2	29
Science	COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE	COMPUT INFORM	1335-9150	3	92
Science	COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE	INTELL AUTOM SOFT CO	1079-8587	3	93
Science	COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE	J COMPUT SYS SC INT+	1064-2307	3	94



Lista revistelor incadrate pe subdomenii, ordonate in functie de scorul de influenta al acestora (AIS)
Indexate in Science Citation Index Expanded Social Sciences Citation Index

Categorie	Subdomeniu ISI	Revista *(revistele marcate cu (*) au acelasi punctaj ca si revista anterioara)*	ISSN	Zona	top
Science	MINING & MINERAL PROCESSING	J UNIV SCI TECHNOL B	1005-8850	2	9
Science	MINING & MINERAL PROCESSING	MAR GEORESOUR GEOTEC	1064-119X	3	10
Science	MINING & MINERAL PROCESSING	MINER METALL PROC	0747-9182	3	11
Science	MINING & MINERAL PROCESSING	INT J COAL PREP UTIL	1939-2699	3	12
Science	MINING & MINERAL PROCESSING	J S AFR I MIN METALL	0038-223X	3	13
Science	MINING & MINERAL PROCESSING	INT J MIN MET MATER	1674-4799	3	14
Science	MINING & MINERAL PROCESSING	J MIN SCI+	1062-7391	3	15
Science	MINING & MINERAL PROCESSING	CAN MIN J	0008-4492	3	16
Science	MINING & MINERAL PROCESSING	ENG MIN J	0095-8948	3	17
Science	MULTIDISCIPLINARY SCIENCES	NATURE	0028-0836	1	1
Science	MULTIDISCIPLINARY SCIENCES	SCIENCE	0036-8075	1	2
Science	MULTIDISCIPLINARY SCIENCES	P NATL ACAD SCI USA	0027-8424	1	3
Science	MULTIDISCIPLINARY SCIENCES	J R SOC INTERFACE	1742-5689	1	4
Science	MULTIDISCIPLINARY SCIENCES	HFSP J	1955-2068	1	5
Science	MULTIDISCIPLINARY SCIENCES	PHILOS T R SOC A	1364-503X	1	6
Science	MULTIDISCIPLINARY SCIENCES	P ROY SOC A-MATH PHY	1364-5021	1	7
Science	MULTIDISCIPLINARY SCIENCES	SCI AM	0036-8733	1	8
Science	MULTIDISCIPLINARY SCIENCES	ANN NY ACAD SCI	0077-8923	1	9
Science	MULTIDISCIPLINARY SCIENCES	NATURWISSENSCHAFTEN	0028-1042	1	10
Science	MULTIDISCIPLINARY SCIENCES	ADV SCI LETT	1936-6612	1	11
Science	MULTIDISCIPLINARY SCIENCES	COMPLEXITY	1076-2787	1	12
Science	MULTIDISCIPLINARY SCIENCES	P JPN ACAD B-PHYS	0386-2208	2	13
Science	MULTIDISCIPLINARY SCIENCES	J ROY SOC NEW ZEAL	0303-6758	2	14
Science	MULTIDISCIPLINARY SCIENCES	ADV COMPLEX SYST	0219-5259	2	15
Science	MULTIDISCIPLINARY SCIENCES	FRACTALS	0218-348X	2	16
Science	MULTIDISCIPLINARY SCIENCES	SCI CHINA SER A	1006-9283	2	17
Science	MULTIDISCIPLINARY SCIENCES	AM SCI	0003-0996	2	18
Science	MULTIDISCIPLINARY SCIENCES	INT J BIFURCAT CHAOS	0218-1274	2	19
Science	MULTIDISCIPLINARY SCIENCES	AN ACAD BRAS CIENC	0001-3765	2	20
Science	MULTIDISCIPLINARY SCIENCES	THESCIENTIFICWORLDJO	1537-744X	2	21
Science	MULTIDISCIPLINARY SCIENCES	MATH MODEL NAT PHENO	0973-5348	2	22
Science	MULTIDISCIPLINARY SCIENCES	CURR SCI INDIA	0011-3891	2	23
Science	MULTIDISCIPLINARY SCIENCES	DISCRETE DYN NAT SOC	1026-0226	2	24
Science	MULTIDISCIPLINARY SCIENCES	ISSUES SCI TECHNOL	0748-5492	3	25
Science	MULTIDISCIPLINARY SCIENCES	CHINESE SCI BULL	1001-6538	3	26
Science	MULTIDISCIPLINARY SCIENCES	S AFR J SCI	0038-2353	3	27
Science	MULTIDISCIPLINARY SCIENCES	SCI ENG ETHICS	1353-3452	3	28
Science	MULTIDISCIPLINARY SCIENCES	INTERDISCIPL SCI REV	0308-0188	3	29
Science	MULTIDISCIPLINARY SCIENCES	ARCH SCI	1661-464X	3	30


MULTISCALE APPROACHES


D. Banabic
Sheet Metal Forming Processes
Banabic
The book gives a synthetic presentation of the research performed in the field of sheet metal forming simulation over the course of more than twenty years by the members of three teams: the Research Centre on Sheet Metal Forming – CERTETA (Technical University of Cluj-Napoca, Romania); AUTOFORM company from Zürich, Switzerland and VOLVO automotive company from Sweden.
The first chapter reminds some fundamental topics of the theory of plasticity. A more extended chapter is devoted to the presentation of the phenomenological yield criteria, emphasizing the formulations proposed by the CERTETA team (BBC models). A section of this chapter has been dedicated to the modeling of the Bauschinger effect, especially the AutoForm model. The sheet metal formability is discussed in a separate chapter. After presenting the methods used for the formability assessment, the discussion focuses on the forming limit curves. In this context, the authors emphasize their contributions to the mathematical modeling of forming limit curves. The role of simulation in the process planning, part feasibility and quality, process validation and robustness are presented based on the AUTOFORM solutions. The performances of the material models are proved by the numerical simulation of various sheet metal forming processes: bulge and stretch forming, deep-drawing and forming of complex parts. Special sections have been devoted to the robust design of sheet metal forming processes, to the springback analysis and Computer Aided Springback Compensation.
The book is useful for the students, doctoral fellows, researchers and engineers who are mainly interested in the mechanical modeling and numerical simulation of sheet metal forming processes.
ISBN 978-3-540-88112-4
9 783540 881124
springer.com
Sheet Metal Forming Processes
Dorel Banabic
Sheet Metal Forming Processes
Constitutive Modelling and Numerical Simulation
Springer

迪哦艾儿伊艾勒 比诶艾娜诶比艾西

金属板材成形工艺:本构模型及数值模拟

科学出版社 Science Press

ESAFORM Bookseries on Material Formings

Series Editor: Elias Cueto

ISBN 978-3-540-8812-5

springer.com

Banabic

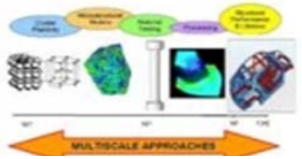
Multiscale Modelling in Sheet Metal Forming

ESAFORM Bookseries on Material Forming

Dorel Banabic

Multiscale Modelling in Sheet Metal Forming

Springer



CIRP - The International Academy for Production Engineering
Editor

VOLUME 1

CIRP Encyclopedia of Production Engineering

Springer Reference

A

Anisotropy

Alexander Brosius[1] and Dorel Banabic[2]
[1]Institut für Fertigungstechnik, TU Dresden, Dresden, Germany
[2]CERTETA-Research Center in Sheet Metal Forming, Technical University of Cluj, Romania, Cluj Napoca, Cluj, Romania

Synonyms

Orthotropy

Definition

As the opposite of isotropy, the term anisotropy defines the dependency between the material response for a defined loading level and the loading direction.

Theory and Application

Introduction

One can distinguish between a "general" anisotropic and an orthotropic material behavior. In sheet metal forming one can usually assume orthotropic behavior in the elastic-plastic behavior due to the production process of the semifinished part by means of rolling. For bulk metal forming, the anisotropic behavior comes more and more into picture and is also limited to the orthotropic type. The elastic region is assumed as isotropic usually because the influence on the forming process itself is negligible. Because anisotropic behavior plays a very important role in sheet metal forming, in the following only this type of semifinished products and the related application in theory and application will be mentioned.

As mentioned before, anisotropic behavior in sheets is an orthotropic system, sometimes also called as "orthorhombic" symmetrical system. That means along the symmetry planes equality between left and right is taken place (Lange 1990).

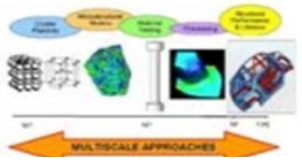
In general, an orthotropic material can be identified by the attribute of uncoupling between normal and shear components – the coupling coefficients of **C** (e.g., C_{14}) in the following equation are equal to zero.

$$\sigma = C \cdot \varepsilon \qquad (1)$$

To describe this kind of anisotropic material behavior precisely, the yield surface is needed. For quite simple but well-known and established yield surfaces, the so-called r-values are used to describe this behavior. The r-value (normal anisotropy) is defined by the ratio of width to thickness strain (measured as true strains). The index indicates the angle between drawing and rolling direction of the material. Usually, the r-values are determined in 0°, 45°, and 90°.

The mean normal anisotropy is defined as

CIRP, International Academy for Production Engineering Research (ed.),
Encyclopedia of Production Engineering, DOI 10.1007/978-3-642-20617-7, © CIRP 2014



CIRP - The International Academy for Production Engineering
Editor

VOLUME 1

CIRP Encyclopedia of Production Engineering

Springer Reference

F

Formability (Damage)

Luigino Filice[1] and Dorel Banabic[2]
[1]Mechanical Engineering, The University of Calabria, Rende, Italy
[2]CERTETA-Research Center in Sheet Metal Forming, Technical University of Cluj, Romania, Cluj Napoca, Cluj, Romania

Synonyms

Forming limit; Workability

Definition

The formability is the capability of a material to undergo plastic deformation to a given shape without defects. Formability limits are a hard constraint when sheet metal parts are manufactured, but also in bulk metal forming, formability limits can be reached leading to faulty parts.

In general the term "formability" usually refers to sheet metals.

Theory and Application

Sheet Metal Formability

At the end of the nineteenth century, due to the development of the sheet forming technology, sheet metal formability became a research topic. Starting from that time, different tests have been proposed. All of them are based on the measure of the maximum deformation that a sheet metal sample can reach.

Sheet metal-forming processes can be characterized by two basic types of deformation patterns: drawing and bending. Concerning drawing one has to distinguish stretching (all the in-plane strain components are greater than zero) and deep drawing (one of the in-plane strain components is less than zero).

Figure 1 shows that formability is a complex characteristic of the materials since different aspects affect its amount. Among them, material properties, process parameters, and strain bounding criteria are probably the most relevant.

As an example, the influence of various parameters on the formability in deep drawing is presented in Fig. 2.

The formability, expressed by the drawing ratio ß = D/d (D being the blank diameter and d the cup diameter), depends on the strain limiting criterion as well as on a process parameter (blank holding pressure p).

The forming region represents the "window" in which material formability is allowed.

A typical defect of formability in bulk metal forming is shown in Fig. 3.

Among the methodologies to evaluate formability, forming limit diagrams plays a relevant role.

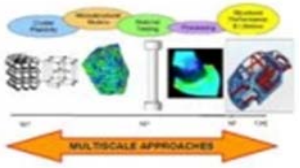
CIRP, International Academy for Production Engineering Research (ed.),
Encyclopedia of Production Engineering, DOI 10.1007/978-3-642-20617-7, © CIRP 2014

Kapitel I

Fließkriterien

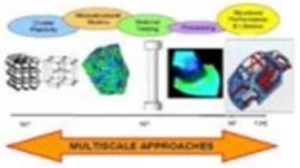
Autoren des Kapitels I
Prof. Dr.-Ing. Dorel Banabic

Institut
Technische Universität Cluj-Napoca,
Rumänien



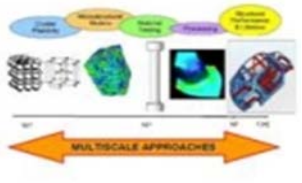
- Introducere
- Obiectivele proiectului
- Planul de realizare al proiectului
- Rezultate semnificative obtinute
- Echipamente achizitionate
- Criteriile minime de performanta. Diseminare
- **Impactul rezultatelor obtinute**
- **Pagina de web a proiectului**

Structura prezentarii



- **Universitatea din Stuttgart, Germania**
- **Universitatea de Tehnologie din Tokyo, Japonia**
- **Universitatea POSTECH, Corea de Sud**
- **Universitatea Catolica din Leuven, Belgia**
- **Universitatea ETH Zurich, Elvetia**
- **Firma AUTOFORM, Zurich, Elvetia**
- **Firma Daimler, Stuttgart, Germania**

Dezvoltarea de colaborari internationale

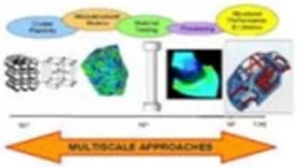


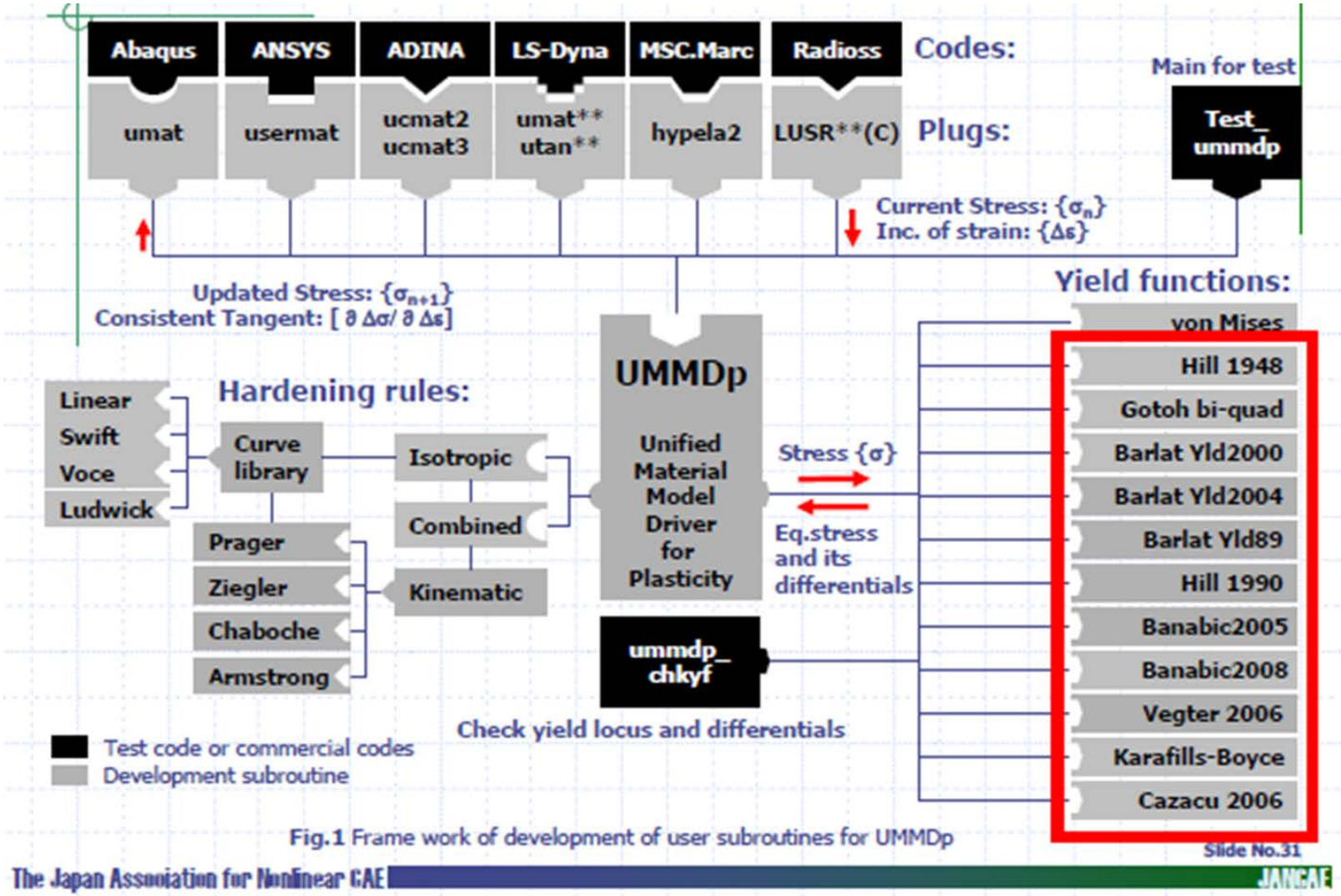
Modele de plasticitate anizotropa BBC 2005 si BBC2008

Implementate deja in programe comerciale de simulare cu EF:

- **AUTOFORM**, utilizat de 95 % din constructorii de automobile pe plan mondial
- **Platforma UMMDp** a Asociatiei Japoneze de Analiza Neliniara CAE (JANCAE)

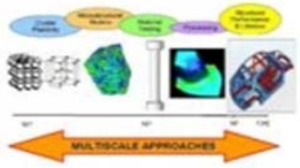
Modelele fenomenologice utilizate in proiect





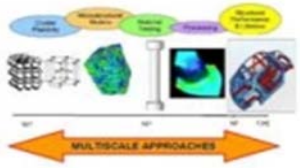
Platforma UMMDp a Asociatiei Japoneze de Analiza Neliniara CAE(JANCAE)

Impactul rezultatelor obtinute in domeniul modelarii comportarii anizotrope in opinia Asociatiei Japoneze de Analiza Neliniara in CAE (JANCAE)



- Introducere
- Obiectivele proiectului
- Planul de realizare al proiectului
- Rezultate semnificative obtinute
- Echipamente achizitionate
- Criteriile minime de performanta. Diseminare
- Impactul rezultatelor obtinute
- **Pagina de web a proiectului**

Structura prezentarii



Pagina de web a proiectului