

# **International Conference on CRACK PATHS (CP 2009)**

Vicenza (Italy), 23 – 25 September, 2009

University of Padua - Stradella S. Nicola, 3 (in the centre of Vicenza)

## **WEDNESDAY 23rd September, 2009**

08.00-08.45 Registration

**08.45-09.00 Opening Ceremony (room Aula Magna)**

**09.00-09.30 Introductory Lecture (room Aula Magna)**

Chairperson: Feargal BRENNAN, Cranfield (UK)

A Brief History of the Crack Tip Stress Intensity Factor and Its Application  
P.C. Paris (page 19)

**09.30-10.30 Plenary Lectures (room Aula Magna)**

Chairperson: Feargal BRENNAN, Cranfield (UK)

09.30-10.00 Influence of Hydrogen and Test Frequency on the Fatigue Crack Path  
Y. Murakami, S. Matsuoka (page 20)

10.00-10.30 Fatigue Crack Path in New Generation Al Alloys: Coupled Influence of  
Microstructure and Atmosphere Environment  
J. Petit, C. Sarrazin-Baudoux, S. Richard, C. Gasqueres (page 25)

10.30-11.00 Refreshment (coffee, drinks, etc.)

**11.00-12.30 Parallel Sessions A1 and B1 (see next pages)**

12.30-14.00 Lunch

**14.00-15.45 Parallel Sessions A2, B2 and C2 (see next pages)**

15.45-16.15 Refreshment (coffee, drinks, etc.)

**16.15-17.40 Parallel Sessions A3, B3 and C3 (see next pages)**

**19.30-21.00 Welcome Party (at the Department of Management and Engineering)**

## **PARALLEL SESSION A1 - Aula Magna**

**23rd Sept., 2009, time 11.00-12.30**

Chairperson: Bruno ATZORI, Padua (Italy)

11.00	On the mechanism of factory-roof formation <u>J. Pokluda</u> , K. Slamecka, P. Sandera (Invited Paper)	page 33
11.25	The crack path evolution for monotonic and cyclic loading <u>K.P. Mróz</u> , Z. Mróz (Invited Paper)	41
11.50	Influence of the loading path on fatigue crack growth under non-proportional mixed-mode loading <u>V. Doquet</u> , M. Abbadi, Q.H. Bui, A. Pons	59
12.10	Near-threshold propagation of Mode II and Mode III cracks L. Holan, R. Pippan, J. Pokluda, J. Hornikova, A. Hohenwarter, <u>K. Slamecka</u>	82

## **PARALLEL SESSION B1 - Room N2**

**23rd Sept., 2009, time 11.00-12.30**

Chairperson: Thierry PALIN-LUC, Talence (France)

11.00	Design of layered ceramics with crack bifurcation/deflection mechanisms <u>R. Bermejo</u> (Invited Paper)	page 35
11.25	Simulation of crack propagation in thermal barrier coatings <u>M. Bäker</u> (Invited Paper)	46
11.50	Damaging and cracks path in bended galvanized specimens: influence of Pb and Sn contents <u>V. Di Cocco</u> , F. Iacoviello, S. Natali	83
12.10	Efficient finite element modeling of the static collapse of complex bonded structures <u>D. Castagnetti</u> , A. Spaggiari, E. Dragoni	99

## **PARALLEL SESSION A2 - Aula Magna - 23rd Sept., 2009, time 14.00-15.45**

Chairperson: Yoichi SUMI, Yokohama (Japan)

- 14.00 The tearing of thin sheets  
E. Bayart, M. Adda-Bedia, A. Boudaoud (Invited Paper) page 38
- 14.25 Brittle failure and crack initiation angle in plates weakened by V- and U-notches under mixed mode (I+II) loading  
F. Berto, P. Lazzarin, M. Elices, F.J. Gomez 136
- 14.45 Spiral crack path in thin sheets  
V. Romero, B. Roman, E. Cerda 113
- 15.05 Crack growth trajectories under mixed mode and biaxial fracture  
V.N. Shlyannikov 114
- 15.25 The frustrating tearing of adhesive films  
B. Roman, E. Hamm, E. Cerda, P.M. Reis 77

## **PARALLEL SESSION B2 - Room N2 - 23rd Sept., 2009, time 14.25-15.45**

Chairperson: Gilbert HÉNAFF, Futuroscope Chasseneuil (France)

- 14.25 A fracture initiation direction influenced by an orthotropic bi-material notch  
J. Klusak, T. Profant, M. Kotoul page 102
- 14.45 Mechanical and fracture properties of thermal barrier coatings fabricated using slurry spray technique  
P. Nguyen, S.Y. Ho, A. Kotousov 116
- 15.05 Crack growth behavior in plasma-sprayed thermal barrier coatings  
S. Zhu, Z. Chen, L. Qian 117
- 15.25 Prediction of the growth rate and propagation direction of fatigue cracks with the configurational forces model  
J. Predan, N. Gubeljak, F.D. Fischer, O. Kolednik 110

## **PARALLEL SESSION C2 - Room N3 - 23rd Sept., 2009, time 14.00-15.45**

Chairperson: Ludvik KUNZ, Brno (Czech Republic)

- 14.00 Damage induced criticality and scaling laws of fatigue crack path  
M. Bannikov, O. Naimark, V. Oborin, T. Palin-Luc (Invited Paper) page 44
- 14.25 Subsurface short cracks path in Ti-6Al-3Mo-0.4Si Ti-alloy  
A. Shanyavskiy, M.D. Banov 68
- 14.45 Crack growth rates for microstructurally short fatigue cracks  
P. Hansson, S. Melin 80
- 15.05 Growth path of small surface-cracks in ultrafine grained copper under cyclic loading  
M. Goto, Y. Ando, S.Z. Han, T. Yakushiji, N. Kawagoishi 92
- 15.25 Experimental and numerical study of fatigue crack growth in notched specimens  
G. Meneghetti, M. Zappalorto, P. Lazzarin 137

### **PARALLEL SESSION A3 - Aula Magna - 23rd Sept., 2009, time 16.15-17.40**

Chairperson: Radomila KONECNA, Zilina (Slovak Republic)

- 16.15 3-D modelling of plasticity induced fatigue crack closure-effect of material constitutive relations  
F. Ellyin, F. Ozah (Invited Paper) page 30
- 16.40 Theoretical prediction of the overload cycle effect on fatigue crack growth in plates of finite thickness  
J. Codrington, A. Kotousov 95
- 17.00 Can we describe kinetics of fatigue crack growth without influence of R-ratio?  
M. Szata, G. Lesiuk 101
- 17.20 Numerical investigation of constraint effects on fatigue crack propagation  
I. Varfolomeev, S. Moroz 134

### **PARALLEL SESSION B3 - Room N2 - 23rd Sept., 2009, time 16.40-17.40**

Chairperson: Masahiro GOTO, Oita (Japan)

- 16.40 Role of the T-stress on the kink of a crack out of an interface  
D. Leguillon, S. Murer page 118
- 17.00 Crack and damage evaluation in low-k interconnect structures under chip package interaction aspects  
J. Auersperg, D. Vogel, M.U. Lehr, M. Grillberger, B. Michel 122
- 17.20 Multiscale material design and crack path prediction of a cementitious cover layer with high toughness  
L.-P. Guo, W. Sun, Andrea Carpinteri, A. Spagnoli, Q.-Y. Cao 154

### **PARALLEL SESSION C3 - Room N3 - 23rd Sept., 2009, time 16.15-17.40**

Chairperson: Claude BATHIAS, Paris (France)

- 16.15 An experimental study of the influence of laser shock peening on fatigue crack growth  
A. Chahardehi, F.P. Brennan, A. Steuwer (Invited Paper) page 32
- 16.40 Fatigue damage evolution in graded materials  
F. Zeismann, M. Besel, A. Brückner-Foit 98
- 17.00 Numerical simulation of crack paths in materials with a functional gradation perpendicular to the crack orientation  
M. Fulland, M. Steigemann, H.A. Richard, M. Specovius-Neugebauer 100
- 17.20 Crack paths in functionally graded materials  
M. Steigemann, M. Fulland, M. Specovius-Neugebauer, H.A. Richard 107

# THURSDAY 24th September, 2009

## 09.00-10.00 Plenary Lectures (room Aula Magna)

Chairperson: Jaroslav POKLUDA, Brno (Czech Republic)

09.00-09.30 Crack Propagation in Lead-Free Solder under Cyclic Loading of Mode I and II  
K. Tanaka (page 22)

09.30-10.00 Quantifying Crack Tip Displacements Fields: T-Stress and CTOA  
J.R. Yates, M. Zanganeh, D. Asquith, Y.H. Tai (page 23)

10.00-10.30 Refreshment (coffee, drinks, etc.)

## 10.30-12.35 Parallel Sessions A4, B4 and C4 (see next pages)

12.35-14.00 Lunch

## 14.00-15.45 Parallel Sessions A5, B5 and C5 (see next pages)

15.45-16.15 Refreshment (coffee, drinks, etc.)

## 16.15-17.20 Parallel Sessions A6, B6 and C6 (see next pages)

Transport from the centre of Vicenza to Villa di Montruglio (about 20 minutes by bus):

- A bus service will be available from **Vicenza to Villa di Montruglio (on the Berici Hills)**, departing from Contrà Barche at **19.15** (the buses will be waiting for passengers outside the Department of Management and Engineering)
- A bus will collect participants booked at NH Jolly Hotel Tiepolo at **19.00** and participants booked at Hotel da Porto at **19.15**.

Villa di Montruglio:

**20.00-20.30 Welcome Music**

**20.30-23.00 Conference Dinner**

## **PARALLEL SESSION A4 - Aula Magna**

**24th Sept., 2009, time 10.30-12.35**

Chairperson: Birger KARLSSON, Göteborg (Sweden)

- |       |  |                        |
|-------|--|------------------------|
| 10.30 | Ferritic ductile cast iron damaging characterization<br>V. Di Cocco, <u>F. Iacoviello</u> (Invited Paper)                      | page 34                |
| 10.55 | Fatigue crack initiation and propagation in superalloy IN 713LC<br><u>L. Kunz</u> , P. Lukáš, R. Konečná                       | 63                     |
| 11.15 | Fatigue crack path through cast Al-Si alloy microstructure<br><u>R. Konečná</u> , S. Fintová, G. Nicoletto                     | 66                     |
| 11.35 | Mechanism of fish-eye formation in the gigacycle fatigue<br>Z. Huang, W.W. Du, <u>D. Wagner</u> , C. Bathias                   | 74                     |
| 11.55 | Microstructure-crack tip interactions in P/M superalloy material at elevated temperatures<br><u>H. Ghonem</u>                  | 128                    |
| 12.15 | Analysis of spectrum fatigue crack growth in AA7050 specimens with three stress concentrations<br><u>W. Zhuang</u> , L. Molent | only in CD Proceedings |

## **PARALLEL SESSION B4 - Room N2**

**24th Sept., 2009, time 10.30-12.35**

Chairperson: Stefano BERETTA, Milan (Italy)

- |       |  |         |
|-------|--|---------|
| 10.30 | Modeling of 3-D fatigue crack growth in real-life components<br><u>D. Bremberg</u> , G. Dhondt (Invited Paper)   | page 39 |
| 10.55 | Crack path prediction in brittle solids by a new discontinuous-like FE approach<br>Andrea Carpinteri, <u>R. Brighenti</u> , A. Spagnoli, S. Vantadori                      | 157     |
| 11.15 | Numerical investigations on the influence of 3D frictional crack surface interaction<br><u>W. Weber</u> , K. Willner, P. Steinmann, G. Kuhn                                | 81      |
| 11.35 | The influence of constraint level on crack path<br><u>M. Ševčík</u> , P. Hutař, L. Náhlík, S. Seitl  | 105     |
| 11.55 | Simulation of short crack propagation in a microstructure using a hybrid boundary element technique<br><u>M. Kübbeler</u> , I. Roth, U. Krupp, C.-P. Fritzen, H.-J. Christ | 112     |
| 12.15 | Approach on the problem of crack path stability of DCDC test specimen<br><u>D.A. Zacharopoulos</u> , F.Th. Givannaki   | 79      |

## **PARALLEL SESSION C4 - Room N3**

**24th Sept., 2009, time 10.55-12.35**

Chairperson: Jesús TORIBIO, Zamora (Spain)

- 10.55 A discussion on major factors affecting crack path of concrete-to-concrete interfacial surfaces  
A. Satoh, K. Yamada, S. Ishiyama page 58
- 11.15 Some issues in the application of the frictional cohesive crack model to dam-foundation joint  
F. Barpi, S. Valente 119
- 11.35 Tensile cracking behaviour of strain-hardening cement-based composites using a micromechanical lattice model  
Andrea Carpinteri, R. Brighenti, A. Spagnoli, S. Vantadori 156
- 11.55 Probabilistic modelling of concrete cracking. First 3D results  
S. Dal Pont, J.-L. Tailhan, P. Rossi 121
- 12.15 Comprehensive evaluation of crack resistance for dam concrete based on temperature stress testing machine  
B. Chen, Y.B. Cai, J.T. Ding, W. Sun, N.N. Shi, B. Dong 155

## **PARALLEL SESSION A5 - Aula Magna - 24th Sept., 2009, time 14.00-15.45**

Chairperson: John R. YATES, Sheffield (UK)

- 14.00 Crack paths in cold drawn pearlitic steel subjected to fatigue and fracture  
J. Toribio, B. Gonzalez, J.C. Matos (Invited Paper) page 45
- 14.25 Fatigue crack initiation and growth on a steel in the gigacycle regime  
with sea water corrosion  
T. Palin-Luc, R. Perez Mora, C. Bathias, G. Dominguez, P.C. Paris, J.L. Arana 87
- 14.45 Crack propagation behavior of SCM440H low alloy steel enhanced by hydrogen  
under long-term varying load and static load  
Y. Kondo, M. Kubota, K. Shimada 140
- 15.05 Crack stability aspects and crack growth habits in single crystals  
Y. Katz 51
- 15.25 A study on the nucleation and evolution of hydrogen induced cracking in pipeline steel  
E.M. Lazcano-Ugalde, J.L. Gonzalez-Velazquez, A.J. Morales-Ramirez 111

## **PARALLEL SESSION B5 - Room N2 - 24th Sept., 2009, time 14.25-15.45**

Chairperson: Kanji YAMADA, Akita (Japan)

- 14.25 Accounting for cohesive process zones in discrete crack path prediction  
C. Netzker, M. Kaliske, G. Geissler page 129
- 14.45 Crack path predictions in Ni-based superalloy plates using coupled  
nonlocal damage-plasticity  
J.P. Belnoue, G.D. Nguyen, A.M. Korsunsky 138
- 15.05 Numerical analysis of 3D subsurface crack propagation in large slewing bearing  
R. Potocnik, J. Flašker, S. Glodež 141
- 15.25 FEM simulation of fatigue damage crack nucleation and growth in a pre-damaged material  
I.K. Korolev, A.B. Freidin, S.V. Petinov 148

## **PARALLEL SESSION C5 - Room N3 - 24th Sept., 2009, time 14.00-15.45**

Chairperson: Véronique DOQUET, Palaiseau (France)

- 14.00 Fatigue optimization of a heavy-duty hydraulic cylinder  
G. Nicoletto, T. Marin (Invited Paper) page 31
- 14.25 Stress field expressions useful to the analysis of crack initiation and early  
propagation phases in notched shafts under torsion  
M. Zappalorto, S. Filippi, P. Lazzarin 135
- 14.45 Selected approaches to probabilistic assessment of fatigue crack growth in metallic  
materials with fairly reduced homogeneity  
I. Černý 147
- 15.05 Fatigue crack propagation in new generation steels for plastic moulds  
D. Firrao, P. Matteis, B. Rivolta, R. Gerosa 139
- 15.25 Lifetime prediction of an expander impeller using 3-D mixed-mode crack  
propagation algorithm  
K. Molla-Abbasi, D. Anding, K. Ziegler 56

## **PARALLEL SESSION A6 - Aula Magna**

**24th Sept., 2009, time 16.15-17.20**

Chairperson: Guido DHONDT, Munich (Germany)

- 16.15 Fatigue crack growth in the cruciform specimens under out-of-phase loading  
D. Rozumek, C.T. Lachowicz, E. Macha (Invited Paper) page 29
- 16.40 Non-local method in fatigue life assessment using critical plane concept  
A. Karolczuk, A. Cichański 62
- 17.00 High cycle fatigue crack paths in C35 steel under complex loading  
Q.H. Vu, Y. Nadot, D. Halm 73

## **PARALLEL SESSION B6 - Room N2**

**24th Sept., 2009, time 16.40-17.20**

Chairperson: Alessandro PIRONDI, Parma (Italy)

- 16.40 Crack path instability in aluminium lithium alloys  
Y.H. Tai, D.T. Asquith, J.R. Yates page 130
- 17.00 Comparison of DBEM and FEM crack path predictions with experimental findings  
in a notched shaft under torsion  
R. Citarella, D. Bremberg, F.-G. Buchholz 150

## **PARALLEL SESSION C6 - Room N3**

**24th Sept., 2009, time 16.15-17.20**

Chairperson: Yoshiyuki KONDO, Fukuoka (Japan)

- 16.15 An investigation on fracture surfaces of shot blasted and as forged components in  
constant and variable loading fatigue  
K. Dalaei, B. Karlsson, L.-E. Svensson, B. Johannesson (Invited Paper) page 40
- 16.40 Thermal variations in static tests on plastics: a first approach to the fatigue  
parameters analysis  
C. Clienti, G. Fargione, G. La Rosa, A. Risitano, G. Risitano 60
- 17.00 Application of subsurface stress/strain fatigue life approach to contact components  
under cyclic bending loads  
G. Shatil 153

## **FRIDAY 25th September, 2009**

### **09.00-10.00 Plenary Lectures (room Aula Magna)**

Chairperson: Gary MARQUIS, Helsinki (Finland)

09.00-09.30 Intergranular Fatigue in Interstitial-Free Steels  
M.N. James (page 21)

09.30-10.00 Crack Paths in the Fatigue and Fracture of Bone  
D. Taylor, P. O'Reilly, S. Kasiri, S. Mahony (page 24)

10.00-10.30 Refreshment (coffee, drinks, etc.)

### **10.30-12.35 Parallel Sessions A7, B7 and C7 (see next pages)**

12.35-14.00 Lunch

### **14.00-15.45 Parallel Sessions A8, B8 and C8 (see next pages)**

15.45-16.15 Refreshment (coffee, drinks, etc.)

### **16.15-17.40 Parallel Sessions A9, B9 and C9 (see next pages)**

### **17.45-18.05 Closing Lecture (room Aula Magna)**

Chairperson: Fernand ELLYIN, Vancouver (Canada)

Fifty Years of Crack Path Research  
Les P. Pook (page 26)

### **18.05-18.15 Closing Ceremony (room Aula Magna)**

## **PARALLEL SESSION A7 - Aula Magna**

**25th Sept., 2009, time 10.30-12.35**

Chairperson: Francesco IACOVIELLO, Cassino (Italy)

10.30	On plate thickness effect in plane problems of elasticity <u>A.G. Kotousov</u> , S. Harding, P. Lazzarin (Invited Paper)	page 36
10.55	Modeling the mechanics of intergranular crack propagation <u>A. Stoll</u> , A.J. Wilkinson	64
11.15	Smart stress-memory patch sensor for fatigue damage of a single steel bar JIS G 3502 – galvanized wire – JSS II 11 – 1994 M. Enoki, Y. Fujino, <u>E. Sorrivi</u> , S. Takayuki, E. Viola	75
11.35	Detection of damage in beams utilising the principle of strain compatibility <u>S.J. Wildy</u> , A.G. Kotousov, B. Cazzolato	93
11.55	Influence of time-dependent processes on intergranular crack path in 2XXX Aluminium Alloys <u>G. Hénaff</u> , F. Menan, G. Odemer	72
12.15	Branching of a dissolution driven stress corrosion crack <u>C. Bjerkén</u>	146

## **PARALLEL SESSION B7 - Room N2**

**25th Sept., 2009, time 10.30-12.35**

Chairperson: Solveig MELIN, Lund (Sweden)

10.30	Crack paths in weld details under combined normal and shear loading <u>Y. Sumi</u> (Invited Paper)	page 47
10.55	Observations of exceptional fatigue crack growth behaviour in friction stir welded aluminium <u>H.J.K. Lemmen</u> , R.C. Alderliesten, R. Benedictus	71
11.15	FEA and experimental study of crack paths in 2198-T8 offset hole SE(T) plates with FSW jointed pad-up under fatigue load <u>Y.E. Ma</u> , P.E. Irving	91
11.35	Modelling residual strength of friction stir welded panels by means of crack tip opening angle (CTOA) <u>A. Pirondi</u>	125
11.55	Experimental analysis of the fatigue strength of a tubular welded joint adopted in a roller coaster structure B. Atzori, G. Manara, <u>G. Meneghetti</u>	143
12.15	A transversal crack in a steel slab and its analysis K. Stransky, F. Kavicka, <u>J. Dobrovska</u> , J. Stetina, B. Sekanina	103

## **PARALLEL SESSION C7 - Room N3**

**25th Sept., 2009, time 10.55-12.35**

Chairperson: Milan KRKOSKA, Delft (The Netherlands)

- 10.55 A weight function method to predict mode I stress intensity factors of multiple cracks  
M.S. Abdul Manan, F.P. Brennan page 127
- 11.15 Stresses and crack tip stress intensity factors around spherical and cylindrical  
voids and inclusions of differing elastic properties and with misfit sizes  
P.C. Paris, T. Palin-Luc, H. Tada, N. Saintier 70
- 11.35 A general weight function for inclined kinked cracks in a semi-plane  
M. Beghini, M. Benedetti, V. Fontanari, B.D. Monelli 61
- 11.55 Photoelastic analysis of crack tip shielding after an overload  
C. Colombo, E.A. Patterson, L. Vergani 104
- 12.15 Stress intensity factors in three-dimensional planar cracks subjected to uniform  
tensile stress  
P. Livieri, F. Segala 151

## **PARALLEL SESSION A8 - Aula Magna - 25th Sept., 2009, time 14.00-15.45**

Chairperson: Neil M. JAMES, Plymouth (UK)

- 14.00 New approach for the T-stress estimation for specimens with a U-notch  
M. Hadj Meliani, Z. Azari, G. Pluvinage, Yu.G. Matvienko (Invited Paper) page 37
- 14.25 Crack initiation and propagation on AISI-SAE stainless steel 304 under rotating bending fatigue tests and close to elastic limit  
G.M. Dominguez Almaraz, V.H. Mercado Lemus, M.L. Mondragon Sanchez 132
- 14.45 Method for efficient optical crack path observation and deformation measurement and its usage  
S. Henkel, H. Biermann, P. Hübner 115
- 15.05 On rolling contact fatigue of gear steels with different inclusion content  
G. Donzella, M. Faccoli, A. Mazzù, C. Petrogalli, H. Desimone 108
- 15.25 An experimental investigation of the crack growth under proportional and non proportional fatigue loading  
P. Zerres, J. Brüning, M. Vormwald 78

## **PARALLEL SESSION B8 - Room N2 - 25th Sept., 2009, time 14.00-15.45**

Chairperson: Andrei G. KOTOUSOV, Adelaide (Australia)

- 14.00 Fatigue behaviour of thermal cutted steel structural element  
J. Kramberger, N. Jezernik, S. Glodež (Invited Paper) page 42
- 14.25 Fatigue crack paths in AA2024-T3 and AA7050-T7451 treatment when loaded with simple underloads spectra  
M. Krkoska, S.A. Barter, R.C. Alderliesten, P. White, R. Benedictus 76
- 14.45 Crack path in torsion loading in very high cycle fatigue regime  
H.Q. Xue, C. Bathias 84
- 15.05 Use of femtosecond laser spectroscopy for micro-crack analysis  
W. Wessel, A. Brückner-Foit, J. Mildner, L. Englert, L. Haag, A. Horn, T. Baumert 89
- 15.25 Fractographic studies of fatigue cracks under pure Mode II loading  
A. Hohenwarter, R. Pippan 124

## **PARALLEL SESSION C8 - Room N3 - 25th Sept., 2009, time 14.25-15.45**

Chairperson: Hamouda GHONEM, Kingston (USA)

- 14.25 Numerical analysis of crack initiation and propagation behaviors in TP-650 titanium matrix composites  
W.D. Song, J.G. Ning, X.N. Mao 55
- 14.45 Cohesive element model for simulation of crack growth in composite materials  
M. Prechtel, P. Leiva Ronda, R. Janisch, G. Leugering, A. Hartmaier, P. Steinmann 88
- 15.05 Fatigue crack growth and failure on a composite helicopter main rotor hub: experimental and numerical investigation  
F. Viganò, A. Manes, M. Giglio 109
- 15.25 Mixed mode crack path investigation in a limestone rock using two circular shape samples –An experimental and theoretical study  
M.R.M. Aliha, M.R. Ayatollahi, D.J. Smith, M.J. Pavier 144

## **PARALLEL SESSION A9 - Aula Magna**

**25th Sept., 2009, time 16.15-17.40**

Chairperson: Markus FULLAND, Paderborn (Germany)

- 16.15 Fatigue crack patterns in ultrasonic peened welded structures during constant and variable amplitude loading  
G. Marquis, T. Nykänen, T. Björk (Invited Paper) page 43
- 16.40 Effect of cold-drawing process on fatigue behaviour of V-shaped notched round bars  
Andrea Carpinteri, R. Brighenti, A. Spagnoli, S. Vantadori 158
- 17.00 Effect of residual stresses and their redistribution on the fatigue crack growth in cold-worked holes  
S. Pasta, G. Virzi Mariotti (presented by G. Barbaraci) 123
- 17.20 Influence of discrete residual stress fields on fracture toughness  
D.T. Asquith, Y.H. Tai, J.R. Yates 131

## **PARALLEL SESSION B9 - Room N2**

**25th Sept., 2009, time 16.15-17.40**

Chairperson: Yury G. MATVIENKO, Moscow (Russia)

- 16.15 Competitions of failure modes under in-phase and out-of-phase loading in a gear steel  
S. Beretta, S. Foletti, K. Valiullin (Invited Paper) page 48
- 16.40 Scale effects in nano-indentation fracture of brittle ceramics arising from crack-microstructure interactions  
N. Payraudeau, K.U. O'Kelly 52
- 17.00 Crack propagation in laminar ceramics  
L. Náhlik, L. Šestáková, P. Hutař 142
- 17.20 A micromechanical damage model of ceramic for shock loading  
H.L. Ren, J.G. Ning 96

## **PARALLEL SESSION C9 - Room N3**

**25th Sept., 2009, time 16.40-17.40**

Chairperson: Silvio VALENTE, Turin (Italy)

- 16.40 In situ monitoring of the crack path in a Ti/SiC metal matrix composite  
P. Lopez-Crespo, A. Kyrieleis, F.A. Garcia-Pastor, M. Peel, P.J. Withers 120
- 17.00 Damage mechanics of bonded joints in composite material under fatigue loading  
G. Meneghetti, M. Quaresimin, M. Ricotta 133
- 17.20 A sub-laminate based damage model to simulate initiation and growth of cracks in laminated composites  
A. Forghani, R. Vaziri, A. Poursartip, F. Ellyin 152

**17.45 - 18.15 Closing Lecture and Closing Ceremony (Aula Magna)**