Czech Society for Mechanics

under auspices of the

FME CTU in Prague

announce holding of the

Workshop on Computational Fatigue Analysis 2024

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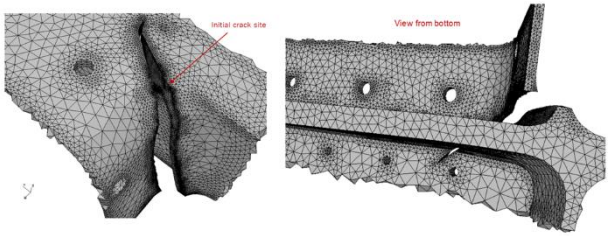
Fatigue Crack Growth



WCFA2024-FCG *)

Karlovo náměstí 13
Prague 2 - Nové Město,
Czech Republic

December 4 - 6, 2024

Introduction

This is the newest volume of our WCFA workshops, a series of educative lectures which runs from 2007. Its 13th volume is dedicated to the topic of Fatigue Crack Growth, accessed from two different views:

- From the point of view of the **Fracture Mechanics Proof of Strength for Engineering Components**, a guideline released by FKM, Germany to guarantee reasonable and safe analysis of cracked/cracking components. The latest 4th edition of this FKM-Guideline from 2018, published only in German, will be lectured. If you are looking for the last available English translation, you will need to refer to the 3rd edition from 2009.
- From the point of view of a **practicing aeronautical engineer** whose daily bread are fatigue crack growth analyses. His expertise stems from aeronautics, however, with no relation to FKM-Guideline mentioned above.

It must be clearly highlighted that only metals will be discussed in the workshop this year.

The workshop offers a wide variety of access modes to the lectures, including also an **on-line presence** or access to the **records from the workshop** only. This enhanced feature has already been available for last two years, thus providing you the opportunity to access also our two previous volumes:

WCFA2023 FKM-NL – FKM-Guideline Non-Linear. The workshop was lectured by **Klemens Rother** as regards the FKM-related part, but it was preceded by a one-day Introduction to Fatigue lectured by Jan Papuga and Martin Nesládek.

For more details, see http://www.pragtic.com/FKMNL.php

WCFA2022 VFA – Vibration Fatigue Analysis. Apart from the above-mentioned Introduction to Fatigue, the key lectures concerned the Vibration Fatigue Analysis. These lectures were shared among the most renowned European vibration fatigue researchers:

- Adam Nieslony
- Denis Benasciutti
- Filippo Cianetti and Massimiliano Palmieri
- Janko Slavič

For more details, see http://www.pragtic.com/2VFA.php

Lecturers

Domenico Quaranta

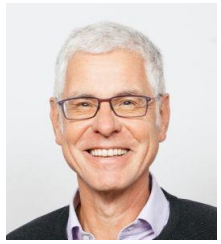
Current position: Principal FDT Engineer at Pilatus Aircraft (Stans, Switzerland)

Academia: MSc Aerospace Engineer in 1998 at Politecnico di Torino (Italy)

Focus: FEM assisted Fatigue and Damage Tolerance assements in Airframes

Relevant activities: Structural assessment and design of: International Space Station Node 2, Meteoroids and Debris Protection System, Aermacchi M346 Front Fuselage, Airbus A380 Freighter Cargo Doors, Structural assessments and design driven by FDT of: Pilatus PC-21 and Modular Trainers.

*) Domenico Quaranta is the provider of the entry figure close to the title of this workshop.



Klemens Rother

He works at the Hochschule München from 2008. He is the Head of the master course on Computational Engineering. He finished his PhD thesis at the TU Darmstadt on Contribution to the computational fatigue life analysis for multiaxial, non-proportional stress.

Teaching areas: technical mechanics, structural integrity, fatigue strength, lightweight construction, concept development

Research areas: service life of welded joints, use of CAE in the early phase, concept development, efficient calculation methods, innovative approaches for fiber composite structures

ORCID profile: ID 0000-0002-9643-4967

Workshop Location

The meeting will be held at the building of the Czech Technical University in Prague on Karlovo náměstí. It can be conveniently accessed by a subway, and one of its exits on Karlovo náměstí station (line B) is directly on the edge of this building. The lecture room No. 215 will host the workshop.

Course Options

To better suit needs of participants coming from various industrial domain or with a specific academic profile, several variants of the course are available as regards its content:

<table>
<tr><td>Wednesday
Dec 4, 2024</td><td>V1: Damage Tolerance, Fracture Mechanics and Crack Growth in Aerospace Industry (D. Quaranta)</td><td rowspan="3">V3:
Complete course</td></tr>
<tr><td>Thursday
Dec 5, 2024</td><td rowspan="2">V2: FKM Guideline on Fracture Mechanics
(K. Rother)</td></tr>
<tr><td>Friday
Dec 6, 2024</td></tr>
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Content of Lectures

The complete program of the workshop can be found on the workshop website www.pragtic.com/FCG.php. Only an overview of discussed topics is provided hereafter for the individual lecturing days.

Dec 14: Damage Tolerance, Fracture Mechanics and Crack Growth in Aerospace Industry (D. Quaranta)

Part 1 - Damage Tolerant (DT) design: Fatigue Cracks in Metals; Fatigue Design Criteria; Development from Safe Life to Damage Tolerance; DT assessment workflow; Differences with respect to the Safe-Life assessment workflow

Part 2 - Linear Elastic Fracture Mechanics (LEFM): Stress Intensity Factors (SIF); LEFM limits of validity; SIFs derivation/calculation methods; SIFs from Weight Functions; SIFs from FEM; Kink Angle

Part 3 - Crack Growth (CG) Models: da/dN models; Paris, Walker, Nasgro, tabular lookup); Small cracks; CG Life integration algorithm; Through cracks in thin structures; Cracks in thicks structures; Residual strength check and critical crack size

Part 4 - DT Special Topics: Retardation effect; Inspection intervals; Continuing damage approach; Primary and secondary cracks

DT design features (crack stoppers); Cold working and interference fit effects; Testing DT designed structures and loads derivation

Dec 5 – Dec 6: FKM Guideline on Fracture Mechanics (K. Rother)

Part 1 - Introductory remarks

Part 2 - Background information and overview of the guideline; Basics on fracture mechanical concepts; Linear elastic vs. elastic-plastic fracture mechanics; Failure assessment diagrams; Static vs. cyclic loading; Assessment concept of the guideline; Input quantities and modelling

Part 3 – Defects; Stress state; Material properties; Computational Procedures

Part 4 - Static loading; Cyclic loading; Advanced topics; Proof concept

Part 5 - Safety margins and reserve factors, sensitivity analysis, probabilistic analysis; Applications

Used Language

English language is the official language of the lectures.

Attendance Fee

The conference fee includes access to the lectures, printouts of the presentations, attendance certificate, meals during lunches plus drinks and meals during coffee breaks. The price for the accommodation is not included.

After informing, a substitute can be sent for the registered participant, who cannot come, for no other additional cost. It is also possible to share some of the longer course variants among several employees.

Members of the Czech Society for Mechanics pay 10% less from any of the prices mentioned hereafter.

The fee is set in several versions, which can be paid either in EUR or in CZK.

The **Early Bird rate (EB)** is available to those who will pay before Sep 30, 2024, the **Regular rate (REG)** is to be paid afterwards.

The individual variants of the course composition are these:

More details about the payment conditions can be found on the workshop website, section Payment (www.pragtic.com/FCGpay.php).

Type	Fee	Attendance type		
		On-site	On-line	From record
V1	EB:	325 EUR/8100 CZK	295 EUR/7300 CZK	325 EUR / 8100 CZK
	REG:	360 EUR/9000 CZK	325 EUR/8100 CZK	
V2	EB:	470 EUR/11700 CZK	420 EUR/10500 CZK	470 EUR / 11700 CZK
	REG:	520 EUR/13000 CZK	520 EUR/11700 CZK	
V3	EB:	650 EUR/16200 CZK	585 EUR/14600 CZK	650 EUR / 16200 CZK
	REG:	720 EUR/18000 CZK	650 EUR/16200 CZK	

In the table below, you can find the services you will get based on your chosen attendance type:

Item	Attendance type		
	On-site	On-line	Record
Access to the recorded lectures	X	X	X
Presentations in pdf	X	X	X
Attendance certificate	X	X	
Real-time access to the workshop	X	X	
Interaction with lecturers during lectures	X	X	
Interaction with participants and lecturers during breaks	X		
Printouts of the presentations	X		
Access to the lectures on-site	X		
Lunches and coffee breaks	X		
Social evening (Thursday, Dec 5)	X		

Organizing Committee

Chairman: Jan Papuga, papuga@pragtic.com
Finances: Jitka Havlínová, csm@it.cas.cz

Conference Contacts

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E-mail: papuga@pragtic.com and above