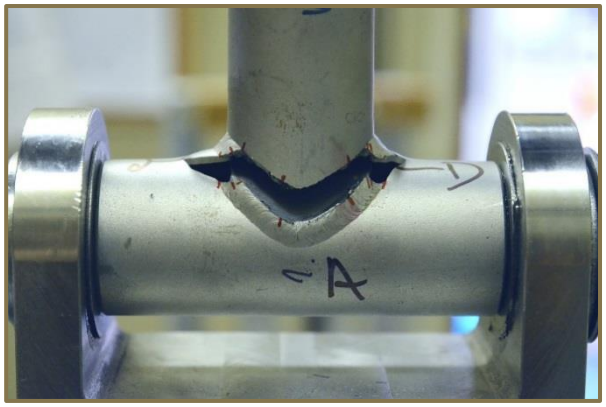
CZECH SOCIETY FOR MECHANICS

UNDER AUSPICES OF

THE FME CTU IN PRAGUE

HOLDS



DECEMBER 2-4, 2019

WORKSHOP ON COMPUTATIONAL FATIGUE ANALYSIS 2019

PAUL HEULER'S LECTURES

KARLOVO NÁMĚSTÍ 13
PRAGUE 2
CZECH REPUBLIC

WEBPAGE
www.pragtic.com/PHL.php
CONTACT
papuga@pragtic.com
+420 737 977 741
(Jan Papuga)

After recent volumes of the WCFA workshop (2016 – Vibration Fatigue Analysis by Neil Bishop; 2017 – Design and Fatigue of Weldments by Zuheir Barsoum and 2018 – FKM Guideline Training by Roland Rennert), we looked for the next topic, which would attract the audience of fatigue analysts in the Central Europe region. The topic had to be finished in a reasonable time, the lecturer not only experienced, but also able to talk to the audience. We decided to bring to Prague some eminent personality, and the advice of Prof Morris Sonsino came in that moment.

The reasons for selecting Dr Paul Heuler are briefly described in the right column. We can be only lucky that he retired recently and thus he got free for accepting our offer. His experience is closely linked to automotive industry, which dominates the industrial production in the Czech Republic. He anyhow also lectured at the TU München for a long time and thus the fatigue prediction issues will not concern only automotive.

As usually in the case of WCFA workshops, we start with a series of introductory lectures for the first day covered by Prof Milan Růžička, Dr Jan Papuga and Dr Martin Nesládek. This part serves as a quick start for those attendants, who have no or only limited experience with fatigue prediction.

LOCATION

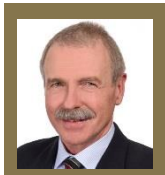
The meeting will be held at the building of the Czech Technical University in Prague on Karlovo náměstí (the same as in 2016 - 2018). It can be conveniently accessed by a subway, and one of its exits on Karlovo náměstí station is directly on the edge of this building. The lecture room No. 215 will host the workshop.

COURSE OPTIONS

No prior knowledge on fatigue analysis is needed. The basic principles of the common fatigue damage estimation are described in the first day, to help the complete freshmen to get on board. The content lectured by Paul Heuler is provided in next one and half days. To better fit needs of participants and to their level of fatigue knowledge, several variants of the course are provided:

Mon Dec 02, 2019	**Introduction to Fatigue** (Růžička, Papuga, Nesládek)	**V1**	**V3**
Tue-Wen Dec 03-04, 2019	**Audi Experience** (Heuler)	**V2**	

Note please that the lectures in the last day will be finished before the lunch, and no afternoon session is anticipated.



PAUL HEULER

Employed:
Audi AG (1998-2018):

Head Fatigue Strength of Car Bodies and Vehicles

IABG Ottobrunn (1984-1997)

TU Darmstadt (1978-1984)

Research assistant (1983 Dr.-Ing. - Fatigue life prediction based on local strain concepts)

Other activities:

1992-1997: Member of NATO's AGARD Structures & Materials Panel

1990-2017: Member of the Programme Panel of DVM Committee on Structural Fatigue

1999-2016: Lecturer on Fatigue at Technical University of Munich

1998-2017: Member of the Working Group on Strength of Components of FKM

More than 90 papers and conference contributions on fatigue and related issues

Member of the editorial board of the FFEMS journal

Deputy Chairman of DVM (German Association for Materials Research and Testing)

MILAN RŮŽIČKA

Employed: FME CTU in Prague (1983-.) - Head of Dept. of Mechanics, Biomechanics and Mechatronics **(2015-..)**

Academia: He finished his Ph.D. thesis in 1984 at the FME CTU in Prague, habilitation 1999 (Doc.), 2005 (Prof.).

He focuses on fatigue in notches, fatigue of welded structures, composite structures, fatigue in composites, use of optical fibres, structural health monitoring.

Other: Secretary of the Czech Society for Mechanics, program director of WCFA meetings.

MARTIN NESLÁDEK

Employed: FME CTU in Prague (2010-),

Academia: Ph.D. thesis (2016) at the FME CTU in Prague.

Focus: Low- and High-cycle fatigue, Fretting, Fatigue in contacts, Thermo-mechanical fatigue.

LECTURES CONTENT

The final program of the workshop will be presented during September 2019 on www.pragtic.com/PHL.php.

DAY 1 (DEC 02, MONDAY): INTRODUCTION TO FATIGUE:

History of Fatigue and Fatigue Prediction Methods; Materials Considerations; Loading Considerations; Stress-Life Based Fatigue; Strain-Life Based Fatigue; Factors Affecting Fatigue Life; Multiaxial Fatigue; Processing of Load Records; Fatigue Prediction in Welds; Fracture Mechanics; The Concept of FE Based Fatigue Analysis; Commercial Applications; Available Data Sources.

DAY 2 (DEC 03, TUESDAY): AUDI EXPERIENCE VOL. 1

- **Statistical concept of fatigue strength assessment** Load and strength/durability as stochastic variables; Distribution and probability density functions; Probability of failure resulting from distributed load and durability variables; Typical scatter values of metallic components; Remarks on lower limits of fatigue properties
- **Derivation of load spectra and requirements** Evaluation of load measurements via counting procedures; Characterization of load spectra; Extrapolation of load measurements and load spectra
- **Load assumptions and requirements for strength and durability assessment of automotive structures** Definition of basic requirements for characteristic load and strength variables; Load measurements – basis for derivation of load requirements; Scaling of load variables; Numerical procedures for load estimates using multi-body-system analyses and FE codes; Substantiation of load requirements through field measurements
- **Standardised Load-Time Histories:** Origins of standardised load-time histories; Overview and some details of present standardised load-time histories; Features of load histories relevant to cumulative fatigue damage; Generation and synthesizing of load-time histories; Applications – car trailer coupling

DAY 3 (DEC 04, WEDNESDAY): AUDI EXPERIENCE VOL. 2

Basic Elements and Specific Aspects of Fatigue Life Prediction: Concepts: Local strain – local stress concept; Assessment of local stress-strain paths at notches; The cumulative damage problem; Transferability of fatigue data of materials and joints to components; Simplified life prediction exercise for some components

Numerical strength and fatigue life assessment of automotive structures: Further remarks on MBS modelling and simulation; The process chain of numerical fatigue assessment; Consideration of joining techniques by a sub-model concept; Aspects of FE modelling and applications - Some hints on the assessment of oscillating components

ATTENDANCE FEE

The conference fee includes access to the lectures, printouts of the presentations, attendance certificate, meals during lunches plus drinks and coffee breaks. 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.

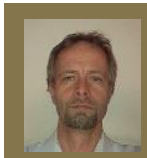
The fee is set in several versions, which can be paid either in EUR or in CZK. The **Early Bird rate** is available to those who will pay before Oct 18, 2019, the **Regular rate** is to be paid afterwards. The individual variants of the course composition are these (see also the table on the previous page): **Members of the Czech Society for Mechanics pay 10% less** from any of the prices mentioned hereafter.

Var.	Days	Dates	Early Bird		Regular rate	
			EUR	CZK	EUR	CZK
V1	1	Dec 02	100	2400	110	2600
V2	2	Dec 03-04	360	8900	390	9900
V3	3	Dec 02-04	400	9900	440	10900

More details about the payment conditions can be found on the website (http://www.pragtic.com/PHL.php).

USED LANGUAGE

English language is the official language of the lectures.



JAN PAPUGA

Employed: FME CTU in Prague (2007-..); Evektor, spol. s r.o. (2006-..)

Academia: He finished his Ph.D. thesis in 2006 at the FME CTU in Prague.

Focus: Multiaxial fatigue, fatigue in notches, fatigue computation methods, validation of fatigue prediction methods, experimental fatigue data aggregation and manipulation

Other: Developer of PragTic fatigue freeware (www.pragtic.com), chairman of WCFA meetings, secretary of DTMA 2011 workshop, leader of the FADOFF project (Fatigue Analysis Documentation Office in 2011-2014, www.fadoff.cz).

WCFA2019-PHL

CHAIRMAN:
Jan Papuga
papuga@pragtic.com

FINANCES:
Jitka Havlínová
csm@it.cas.cz