



BILAL ALI QADRI

PhD defence

**STRUCTURAL DAMAGE
DETECTION UNDER
ENVIRONMENTAL AND
OPERATIONAL VARIABILITY:
AN EXPLORATION OF TWO NEW
VIBRATION-BASED SCHEMES**

**5 MARCH 2021
at 13:00-17:00**

Due to the Covid-19 situation, the PhD defence
will be carried out via Microsoft Teams.



DEPARTMENT OF THE BUILT ENVIRONMENT
AALBORG UNIVERSITY

PHD DEFENCE BY BILAL ALI QADRI

Structural Damage Detection under Environmental and Operational Variability: An Exploration of two new Vibration-Based Schemes

PhD defence organized by Department of the Built Environment, Aalborg University

TIME

Friday 5 March 2021, 13:00 – approx.17:00

HOW TO PARTICIPATE

Due to the Covid-19 situation, the PhD defence will be carried out via Microsoft Teams. Please send an email to [Linda Vabbersgaard Andersen](mailto:Linda.Vabbersgaard@et.aau.dk) no later than 3 March 2021 and you will get an invite for the event and, if requested, a copy of the thesis.

SUMMARY OF THE THESIS

This thesis explores two new vibration-based damage detection schemes, which aim at improving damage detectability. Damage detectability is governed by the ratio between sensitivity to damage (high is good) and sensitivity to environmental and operational variabilities (high is bad). There are two ways to improve this ratio; one way is to mitigate the effect of such variabilities and the second way is to increase sensitivity to damage. The first method, which is a cointegration-based scheme, confronts the sensitivity issue by mitigating the effect of environmental and operational variabilities. The scheme operates by cointegrating Mahalanobis distances of discrete Fourier coefficients.

The second scheme explores the applicability of using designed closed-loop mode shapes as features, which combine attributes from both ways by offering adequate sensitivity to damage and robustness to environmental and operational variabilities.

ASSESSMENT COMMITTEE

- Assoc. Prof. Zhenyu Yang, Dept. of Energy Technology, Aalborg University (chairman)
- Prof. Anders Brandt, The University of Southern Denmark
- Prof. Elizabeth J. Cross, University of Sheffield

PHD SUPERVISORS

- Supervisor, Prof. Anders Schmidt Kristensen, Dept. of Energy Technology, Aalborg University
- Co-supervisor, Assist. Prof. Martin Dalgaard Ulriksen, Dept. of Energy Technology, Aalborg University

MODERATOR

- Assoc. Prof. Simon Pedersen, Dept. of Energy Technology, Aalborg University

PROGRAM

13:00: Welcome by Moderator

13:05: Lecture and presentation by Ph.D. student (45 min)

13:50: Break

During the break, participants can email questions to the moderator, Simon Pedersen spe@et.aau.dk.

If such are received, the questioner puts them forward after the assessment committee has finalized their question and answer round

14:00: The assessment committee is asking questions to the work

16:00: End of defence. The assessment committee enters another "room", evaluates and writes the final assessment

16:30: (approx.) The assessment committee rejoins the "Defence room" and announces its decision

17:00: End of event