Faculty of Engineering

Summer Research Program 2023-2024

Project Title: Implementation of Benchmark Problems in Structural Reliability for the JCSS Probabilistic Model Code

Supervisor(s): A/Prof Colin Caprani; Dr Shihab Khan

Department: Civil Engineering

Email: colin.caprani@monash.edu

Website profile of project supervisor: https://www.monash.edu/engineering/colincaprani

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Objective

Modern codes of practice for structural engineering are based on probabilistic models so that safety is managed to an acceptable level. The Joint Committee of Structural Safety's Probabilistic Model Code (JCSS PMC) sets the basis for codes internationally. Although the PMC has existing for many years, there remains a lack of benchmark implementation of the models inhibiting adoption in practice. This work will leverage collaborative tools such as the python toolbox PySTRA, JupyterBooks, and Github, to create the benchmark examples.

Project Details

The PMC is very influential in managing structural engineering risks. While there are some examples already created, they tend to be simplistic and closed-form. Nowadays structural reliability is implemented computationally, and packages like PySTRA are written for this. However, there is a lack of benchmark examples implemented to support and explain the PMC. These examples facilitate new researchers and practitioners leveraging the PMC models to achieve improved designs and code calibrations. This work is vital as we seek to reduce the unnecessary use of construction materials in design and repairs.

This work will examine the literature for existing examples and will create new examples to illustrate the use of the PMC with modern computational and collaborative tools such as PySTRA, JupyterBook, and Github. The examples will be created to illustrate the vital aspects of the PMC, and their creation will also uncover situations for which there is still a lack of knowledge.

Prerequisites

Students interested in computation in structural engineering are encouraged to apply.