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Review of Thesis

submitted in partial fulfilment of requirements for promotion to associate professorship

Specialization: Theory of Building Structures and Materials

Applicant: Dr.-Ing. Roman Lenner, PE

Reviewer: Prof. Ing. Drahomír Novák, DrSc.

Thesis title: Bridge Traffic Loads: Design and Assessment of Short-to-Medium Span Bridges

Importance of topic of thesis

Comments: Development of traffic loading models for bridges is extremally important part of reliability assessment. The theses represents a systematic research of traffic loading and all related aspects with clear targets and benefits. It can be certainly assessed as high quality research with siginificant importance as many short-tomedium span bridges were constructed many years ago and need to evaluate theirs performance under heavier traffic is evident.

Superior	Good	Average	Poor	Not applicable
☐	☒	☐	☐	☐

Method of solution

Comments: Author provides his contribution to to field of traffic load modelling and relaibility assessment of structures.The following distinctive topics are: Data-driven approaches of developing load models based on WIM data, developing of a load model for design in general term, adjustment of partial safety factors within the semi-probabilistic format, special consideration for design and assessment including consideration of special vehicles. Applicability of methods are illustrated using several examples of relaibility assessment.

Superior	Good	Average	Poor	Not applicable
☒	☐	☐	☐	☐

Quality and correctness of results achieved

Comments: Theses topics are very well described including many references, which put quality and correctness of results achieved by author to high level, as the reader of theses has a constant evidence what other researchers did in the field and what was contribution of author. Also many achievemnts wer already published, so quality and correctness of results were evaluated and can be assessed as superior.

Superior	Good	Average	Poor	Not applicable
☒	☐	☐	☐	☐

Originality of results achieved

Comments: First, author achieved in the field some original results, especially developed load model and (chapter 3) and discussion of aspects for design and assessment (Chapter 4). Examples of relaibility assessment, presented on chapter 5, are unique and reflects cooperation of author with South Africa researchers. Moreover, the complex description of load topic as presented in theses can be regarded also as very valuable and original material for other researchers.

Superior	☒	Good	☐	Average	☐	Poor	☐	Not applicable	☐

Publication rate of results achieved

Comments: Author uses in the theses the results of 9 publication, all of them are as results of international cooperation co-authored by foreign researchers. Note, that in 3 of them author of theses is first author. Publication rate is certainly adequate for habilitation.

Superior	☐	Good	☒	Average	☐	Poor	☐	Not applicable	☐

Response to results and citation rate

Comments: Response to results - number of citation according to WoS is 99 (with selfcitations), according to SCOPUS is 152 (with selfcitations), 105 (without selfcitattions). Number of documents registered in WoS is 17.

His h-index is 7 (WoS), 9 (SCOPUS with selfcitations), 7 (SCOPUS without selfcitations).

Superior	☒	Good	☐	Average	☐	Poor	☐	Not applicable	☐

Applicability of results to development in the field and for further research

Comments: There is a high possibility of significant impact of results at research level for development and further research. Such traffic loading models are generally needed for reliability design/assessment of bridges. Applicability in reliability engineering field and code development/verification (certainly development of next Eurocodes) can be expected/reccomended.

Superior	☒	Good	☐	Average	☐	Poor	☐	Not applicable	☐

Applicability of results to technical practice

Comments: The utilization of theses results in technical practice can be quite difficult, direct applicability is limited as engineers are usually less familiar with probabilistic approaches and probabilistic modelling. From this point of view the chapter on influence lines utilization gained practical importance. And naturally development of partial safety factores within the framework of semi-probabilistic approach is the most valuable for practice. The applicability of all presented results can be mainly expected for advanced probabilistic bridge modelling.

Superior	☐	Good	☒	Average	☐	Poor	☐	Not applicable	☐

Compliance with requirements on thesis – quality of thesis

Comments: Requirements on theses are certainly fullfiled, quality from scientific point of view is very good, theses has a logic structure and flow, quality of pictures is good. Note, that the readability of theses could be generally higher.

Superior	☐	Good	☒	Average	☐	Poor	☐	Not applicable	☐

Comments

Overall evaluation of thesis

Theses represents a comprehensive significant contribution to the topic of traffic modelling. Author achived important results already published in papers. Therefore, after sucussfull defense, I certainly recommend Dr. Roman Lenner to be promoted to be associate professor.

Additional comments on the thesis and the author:
Following comments/questions are supposed to be discussed during defense:
1. Examples of reliability assessment (chapter 5) represents relativelly simple limit state functions, hwere both resistance and action of load can be written into formulaes. How about the case where resistance is calculated by computationally time demanding nonlinear FEM , the consideration of load is affected then somehow?
2. Reliability method FORM is used in theses, author used some specific software with this implemented method?
3. Reliability index 3.8 and usage for assessment of existing structures: There are some approaches which suggest to decrease that index depanding on age and remaing life-time of bridge..., what do you think about it?
4. Generalized extreme value distribution (GEV), equation 10 and 18, is basically same, also with similar extreme value theory description, especially formulae could appear just once in theses.

Promotion to associate professorship recommended	***yes*** ☒	***no*** ☐

Date: 22.1.2024

Reviewer's signature: [redacted]