UNIVERSITY OF OREGON

MEMO FROM: Professor Dr. Peter B Gilkey
MEMO RE: Habilitation Thesis of Lenka Zalabová
MEMO DATE: 12 December 2019

The study of differential geometry is intimately related to the study of the (local) transformations and the associated transformation (semi-) groups. As noted in the introduction, the author focuses primarily on parabolic geometries and the geometries which arise as generalizations of symmetric spaces, real sub-maximally symmetric parabolic geometries, and the configuration spaces of non-holonomic mechanisms in control theory. This naturally leads to rather complicated combinatorial questions which are best treated using computer algebra.

The thesis begins with a brief review of affine geometries, homotheties, and symmetric affine geometry. This is a topic close to the reviewer's heart and the treatment is well written and comprehensive. The affine space of dimension has the affine group of linear transformations (the so called Ax+b group) which has dimension n^2+n. One is interested in other geometries, which are not flat, and which have lower dimension; these are called submaximal. This plays a crucial role in the 2-dimensional setting as is well known.

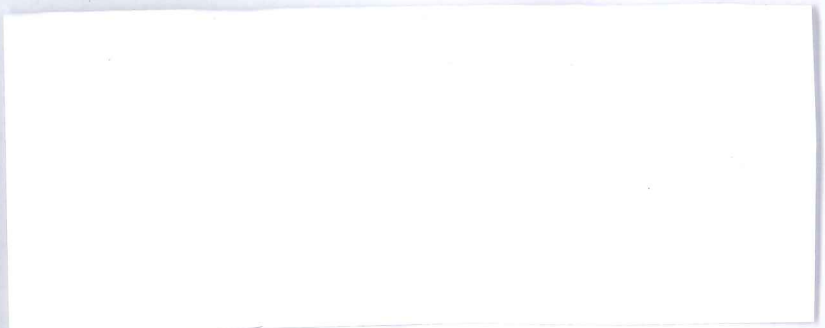
The reviewer will not recap the thesis. Although formidably technical, this is inherent in the field, and the results are presented clearly and in a fashion accessible to a knowledgeable audience. These theorems are applied appropriately in various contexts; see, for example, Section 2.5 that treats symmetries of almost CR structures. The papers comprising these appear in first rank journals:

1. Chapter 1. Journal of Geometry and Physics. A first rate journal (impact factor .806)
2. Chapter 2. SIGMA Symmetry, Integrability and Geometry. A very good journal.
3. Chapter 3. Journal of Geometric Analysis. A first rate journal (Impact factor .959)
4. Chapter 4. Transformation groups. A first rate journal (Impact factor .784)
5. Chapter 5. Journal of Dynamical and Control System. A first rate journal (Impact factor 1.169).

So I would rate 4 of the publications in absolutely top rate journals and the remaining in a very good journal. So the overall quality of the work is high. Math Sci Net reveals that she has 15 publications that have been cited 49 times by 5 authors. This is another measure of her impact on the field; her most cited work (with 9 citations) appeared in Diff. Geo. Appl. in 2009.

Conclusion. The habilitation thesis entitled "Filtered Manifolds with Distinguished Transformations and Transformation Groups" by Mgr. Lenka Zalabová, Ph.D. ***fulfills*** requirements expected of a habilitation thesis in the field of Mathematics - Geometry].

Respectfully submitted



Peter B Gilkey
Professor of Mathematics University of Oregon
Member of the Institute for Theoretical Science University of Oregon
Fellow of the American Mathematical Society.