



Prof. Dr.-Ing. habil. Dr. h.c. Chuanzeng Zhang
Paul-Bonatz-Straße 9-11
57076 Siegen, Germany
Telefon: +49-271-7402173
Telefax: +49-271-7404074
E-Mail: c.zhang@uni-siegen.de
Internet: www.statics.uni-siegen.de

To whom it may concern

Siegen, 18. November 2016

Dear Sir/Madam:

With this letter I would like to support Dr. Mikhail Golub for his submitted thesis entitled "Elastic wave diffraction, energy localization and resonance effects in damaged multi-layered structures" for the degree of doctor of physical and mathematical sciences.

Due to the increasing complexity of civil objects used daily, damage detecting technologies become more and more important. The object's serviceability is affected by aging, and by the dangerous combination between strong winds, ultraviolet light, corrosion and fatigue. Delaminations usually grow from imperfect interfaces or distributed micro-cracks. The prevention of failures could be improved via ultrasonic non-destructive evaluation (NDE) with the installation of health monitoring systems that could assess the structural integrity and detect interior damages before a catastrophic failure occurs.

In recent years, Dr. Mikhail Golub has made a good progress in the modelling and analysis of novel multifunctional composites known as phononic crystals as witnessed by a series of articles published in top journals. He has also performed high-level research works on partially damaged zones and imperfect contact interfaces in multi-layered composite structures. There is no doubt that his research results included into his thesis "Elastic wave diffraction, energy localization and resonance effects in damaged multi-layered structures" present novel and significant contributions to mechanics of solids, phononics and ultrasonic non-destructive evaluation (NDE) techniques.

For the above mentioned reasons, I highly recommend the acceptance of the thesis submitted by Dr. Mikhail Golub.

Sincerely yours

(Prof. Dr.-Ing. habil. Dr. h.c. Chuanzeng Zhang)

Prof. Dr.-Ing. habil. Ch. Zhang
Chair of Structural Mechanics
Department of Civil Engineering
UNIVERSITY OF SIEGEN
D-57068 SIEGEN, GERMANY