

Proceedings of the Online Conference
“Applications of Physics in Mechanical
and Material Engineering”
(APMME 2021)

February 19, 2021

Editors of the proceedings:

Wojciech Sochacki
Sebastian Garus
Marcin Nabiałek

WARSAW

POLISH ACADEMY OF SCIENCES
INSTITUTE OF PHYSICS

Scientific Committee:

Wojciech Sochacki (*Chairman*)

Mechanical Engineering Section

Janusz Szmidla (*Chairman*)

Dawid Cekus (*Vice-Chairman*)

Materials Engineering Section

Marcin Nabiałek (*Chairman*)

Jerzy J. Wysłocki (*Vice-Chairman*)

M.M.A.B. Abdullah	J. Gondro	A. Sapietová
Y. Aksu	S. Hasani	V. Savinkin
R. Babilas	W. Kaszuwara	A. Seifoddini
J. Bajkowski	M. Klimer	K. Sokół
M. Bajkowski	M. Kubiak	M. Sroka
P. Bała	A.P. Markopoulos	A. Surleva
K. Błoch	G. Marmaryan	R. Szczęśniak
W. Borek	G. Moskal	M. Šofer
G. Dercz	K. Pawlik	A. Śliwa
T. Domański	P. Pawlik	T. Tański
A. Dudek	W. Piekarska	L. Toth
A. Durajski	P. Pietrusiewicz	S. Uzny
S. Garus	B. Posiadała	P. Vizureanu
K. Gawdzińska	J. Przybylski	S. Walters
P. Gębara	M. Sága	R. Zalewski
G. Golański	A.V. Sandu	A. Zieliński

Organizing Committee:

Chairman: Sebastian Garus

Vice-Chairman: Wojciech Sochacki

Vice-Chairman: Marcin Nabiałek

Secretary: Paweł Kwiaton

Members: Justyna Garus

Bartłomiej Jeż

Parisa Razaei

Preface

The Scientific Conference “Applications of Physics in Mechanical and Material Engineering” (APMME) was very successfully held online on February 19, 2021. The organizer of APMME was the Department of Mechanics and Machine Design Fundamentals at the Faculty of Mechanical Engineering and Computer Science of the Czestochowa University of Technology, Poland.

The honorary patron of the conference was the Rector of the Czestochowa University of Technology, prof. dr hab. inż. Norbert Szczygiol. Special gratitude for approving the idea of organizing APMME 2021 goes to the Faculty Dean, prof. dr hab. inż. Małgorzata Klimek.

On behalf of the Scientific and Organizing Committees of APMME 2021, we would like to thank the Rector for his patronage over the conference and the Dean for her significant help in the publication process of post-conference papers. We would also like to express our thanks to all conference participants who kindly responded to the Organizing Committee’s invitation.

The APMME 2021 Conference once again became a platform for attendees from Poland and abroad to present and discuss their latest achievements in the field of physics applications in mechanical and material engineering. This time, due to the Covid-19 pandemic, the conference was held online. The organizers express their hope that its next edition will take place in stationary form, with participants meeting in person, conducting important discussions and renewing their friendships.

The conference was attended by 100 guests from ten research centers in Poland and also from Slovakia, Romania, Bulgaria, Hungary, Great Britain, Greece, Turkey, Malaysia, Iran, Czech Republic, Russia, France, South Korea, Thailand, Libya, and Indonesia. This year, the participants could present their papers only at poster sessions. The post-conference papers were reviewed and sent for approval to the Editors of *Acta Physica Polonica A*.

The Guest Editors appreciate the help of the Editorial Board of *Acta Physica Polonica A* in preparing the present issue.

Wojciech Sochacki
Sebastian Garus
Marcin Nabiałek
Guest Editors