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PREFACE

The present volume is dedicated to selected papers of the *"fourth International* ***Workshop on Mathematical Modeling and Renewable Energies"*** (MMRE'2024), organized by the Mathematical Modeling and Numerical Simulation Research Laboratory, and held in Badji Mokhtar University-Annaba-Algeria, 04-06 November 2024.
This fourth series of workshops that brings together researchers from all over the world to present and discuss the latest research, contribute to sustainable environment, technology and renewable energies development, and encourage more research cooperation. The will of the authorities, together with the important role of scientists in creating various opportunities is to strengthen the research culture and downstream research outputs, ultimately solving problems in industry and society.

The workshop technical program includes five keynote speakers, invited speakers, oral, and poster presentations. Session tracks included renewable energies and sustainable environment, artificial intelligence, technology and development, material science and energy. Over 80 scientists and engineers attended the workshop from different countries with diverse backgrounds from academia and industry in Africa, Europe, Canada and America. Oral presentations in hybrid format (offline and online) include 50 full papers, 20 abstracts and 16 posters. All papers presented formed the core of the conference, focusing on the workshop theme and providing many opportunities for discussion, ultimately leading to a sustainable environment and renewable energies. Distinguished plenary speakers from five leading experts presented their outstanding research achievements in various areas of mathematical modeling, renewable energies, environment and sustainable energy. Presentations cover a wide range of workshop topics, from disaster management to new materials for energy. The keynote speeches and progress reports on their research build bridges between different subject areas in energy, economics, artificial intelligence, machine and deep learning, and provide insight into new areas for non-experts. In addition to the main workshop, we had a half day for researchers from industry, more precisely "SONELGAZ" to present real problems and discuss some points of common interest, for future collaborations

Papers for this workshop have been selected following a rigorous peer review process. International and national peer reviewers reviewed all papers, and a minimum of three reviewers were required to review each full paper. On this occasion, we would like to thank the organizing committee, authors, reviewers, and volunteers for their professionalism and for always working hard to make the workshop a success. Contributions and presentations also make this event a very exciting forum, adding value to learning, discussion and exchange of ideas, and to all speakers and authors meeting and interacting with old and new people from different countries. We would also like to express our sincerest gratitude to our sponsors: Faculty of Sciences, **VIVA MALL**, LAM2SIN for making this conference so worthwhile. We hope that future edition will be as exciting as the last one, where the evidence of contribution shown through these proceedings is very promising.

List of Member of Editor, Technical Program and Committees are available in:

https://mmre2024.sciencesconf.org/