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Intelligent Manufacturing and Mechatronics

Selected Articles from iM3F 2023, 7–8 August, Pekan, Malaysia

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Preface

The fourth edition forum of the Innovative Manufacturing, Mechatronics and Materials Forum 2023 (iM3F 2023) organized by Universiti Malaysia Pahang Al-Sultan Abdullah through its Faculty of Manufacturing and Mechatronic Engineering Technology was held on 7 and 8 August 2023. The main field focuses on Manufacturing, Mechatronics as well as Materials.

About 95 submissions were received during iM3F 2023 and were reviewed in a single-blind manner, and 48 papers were advocated by the reviewers to be published in this Springer Proceedings of Materials. The editors would like to express their gratitude to all the authors who submitted their papers. The paper published in this proceeding has been thoroughly reviewed by the appointed technical review committee which consists of various experts in the field of materials and manufacturing engineering.

The conference had brought a new outlook on cutting-edge issues shared through keynote speeches by Assoc. Prof. Ir. Dr. Haji Nik Mohd Zuki Nik Mohamed, Prof. Eng Hwa Yap and Prof. Gian Antonio Susto.

Finally, the editors hope that readers find this volume informative as we thank Springer Proceedings in Materials for undertaking this volume publication. We also would like to thank the conference organization staff and the international program committees' members for their hard work.

Pekan, Pahang, Malaysia
November 2022

Radhiyah Abd. Aziz
Zulhelmi Ismail
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Contents

Relationship Between Strength Development and Porosity of Epoxy-Based Mortar

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Nur Farhayu Ariffin, Sharifah Maszura Syed Mohsin, Khairunisa Muthusamy, Fadzil Mat Yahaya & Saffuan Wan Ahmad

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Abstract

Epoxy resin is conventionally combined with a hardener for the purpose of curing. However, prior research has indicated the potential for epoxy resin to undergo curing in the presence of calcium hydroxide originating from cement hydration. This current study delves into the utilization of commercially accessible epoxy resin without a hardener as an additive in mortars, aiming to enhance mortar strength. The mortar formulations were created with a cement to fine aggregate mass ratio of 1:3, a water-cement ratio of 0.48, and varying epoxy content at 5, 10, 15, and 20% of the cement weight. Subsequent to formulation, the mortars underwent periods of dry curing as well as 5 days of wet curing followed by additional dry curing, all within a tropical environment. The outcomes of the study revealed that the optimal epoxy content for the wet-dry curing process was 10%. Mortars containing 10% epoxy demonstrated notably heightened compressive and flexural strengths compared to the control mortar that lacked epoxy. Over extended dry curing periods, the strength progression of the epoxy-altered mortars exhibited continuous enhancement. Concurrently, the porosity of mortars incorporating epoxy experienced a reduction as the curing duration increased. These findings indicate the viability of epoxy

resin devoid of a hardener as a polymeric admixture to augment both the strength and durability of mortars. The ideal epoxy proportion for effective wet-dry curing was determined to be 10%, while the improvement in mortar strength persisted with extended periods of dry curing. Furthermore, the curing period exerted a decreasing influence on the porosity of mortars modified with epoxy.

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