Foreword

Engineering science and technology are important driving forces in the development of society, and engineering fronts set important guidelines for the future development of engineering science and technology. Today, a new round of technological revolution and industrial transformation is triggering profound changes, accelerating the evolution of engineering science and technology. Understanding trends and aiming to be at the forefront of global engineering science and technology has become a strategic choice for countries worldwide.

The Chinese Academy of Engineering (CAE), the most honorable consulting academic institution in China, shoulders the historical mission of playing an academic leadership role and promoting the development of engineering science and technology. Since 2017, the CAE has been organizing a project known as "Global Engineering Fronts" every year, which aims to assemble talents in the field of engineering science and technology to present global engineering research and development fronts by reviewing global papers, patents, and other data. The results are also expected to provide a reference for people on responding to global challenges and achieving sustainable development.

The 2020 Global Engineering Fronts project continues to rely on nine academic divisions and academic journals of the CAE to identify 93 global engineering research fronts and 91 global engineering development fronts. This is done by paying equal attention to the engineering research and development fronts, integrating quantitative analysis and qualitative research, and combining data mining and expert argumentation. Among these, 28 key engineering research fronts and 28 key engineering development fronts are selected for detailed interpretations.

In 2020, more experts from the field of engineering science and technology and informatics science were invited, and there were deep interactions between experts and diversified data sources. In the process of data analysis, experts are involved in reviewing and adjusting the results to effectively maximize the utility of papers, patents, and data indicators, thereby ensuring the reliability and objectivity of the results.

This report presents the results of the 2020 project and comprises two parts. Part A explains the data and methodology. Part B presents the technology reports focusing on nine fields: (i) Mechanical and Vehicle Engineering; (ii) Information and Electronic Engineering; (iii) Chemical, Metallurgical, and Materials Engineering; (iv) Energy and Mining Engineering; (v) Civil, Hydraulic, and Architectural Engineering; (vi) Environmental and Light Textile Engineering; (vii) Agriculture; (viii) Medicine and Health; and (ix) Engineering Management. Each report describes and analyzes the engineering research and development fronts in these fields and explains the key fronts in detail.

Identifying engineering fronts is a complex and challenging task. In this process, the research team gradually explored a unique research path, that is, the research, forums, and journals were closely integrated to promote each other. The project was supported by thousands of academicians and experts from various fields and institutions. We are grateful to all of them!