Preface

This book is the result of many years of experience teaching kinematics and dynamics of mechanisms at Malaga University. The compilation of different class notes resulted in the first book by the authors in 2000. Along the last years, five improved editions have been printed, all of them only available in Spanish. At present, many universities in Spain and Latin America use this book as a teaching support.

In this first edition in English, we have included those chapters that we think are essential in a Theory of Mechanisms and Machines course. Instead of following a rigid order per topic, the chapters have been organized the main goal being to present the contents in a fluid way, trying not to cut the rhythm of the development. So, the first part completely develops the kinematic and dynamic analysis of linkages. Then, it continues with dynamics, studying flywheels and vibrations in systems with one degree of freedom. Back to kinematics, it studies the transmission of motion with gears. Finally, it presents the main concepts of the synthesis of mechanisms as well as the latest techniques in this field, such as an optimization method based on evolutionary algorithms and a new method to measure the error between two curves based on turning functions. Several examples are included to compare the results obtained following different synthesis methods.

At the end of the book, there are three addendums that complete the concepts developed in some of the chapters and that help the student to assimilate them. The first addendum develops the trigonometric method for the position analysis of different linkages. The second one includes Freudenstein's method applied to the resolution of Raven's position equations in a four-bar linkage. Finally, the last addendum solves the kinematic and dynamic analysis of a six-link mechanism using different methods explained in this book.

Because of its educational focus, we have included some graphical methods in this book. Although, nowadays, the use of analytical methods is basic in Theory of Mechanisms and Machines, according to our experience, the didactic aspect of

graphical methods is unquestionable. Therefore, we use them at the beginning of the kinematic and dynamic analysis of linkages. This helps to consolidate new concepts and to better understand the behavior of mechanisms. Then, once this has been achieved by the student, modern and powerful analytical methods are developed.

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