Preface to the Third Edition

Design with composite materials is conducted in a two-step process: *preliminary design* and *detailed analysis*. In large aerospace companies, once preliminary design is done, the project is handed over to the detailed analysis team, but in most other industries the whole process is done by the same person or the same team. Preliminary design is covered by this textbook. The online software *cadec-online.com* is helpful for that as well. Detailed analysis is covered by companion textbooks: *Finite Element Analysis of Composites Materials Using Abaqus* [1] and *Finite Element Analysis of Composites Materials Using ANSYS* [2]. Together, these textbooks cover all *mechanics* aspects of the design including deformation and strength. Other topics that might be relevant depending on the application are covered in *Multifunctional Composites* [3].

The second edition of this textbook has been on the market for seven years. In that time, it has being broadly adopted for both self-study and teaching in senior undergraduate and master programs worldwide. This third edition has been updated to incorporate the latest state-of-the-art analysis techniques for the preliminary design of composite structures, including *universal carpet plots*, *reliability*, *basis values*, *temperature dependent properties*, and many others.

Furthermore, revisions have been highly focused on making the textbook easier to use. The content has been streamlined for teaching, with updates, substitutions, and reorganizations aimed at making the content more practical and pertinent to industry needs. All examples have been revised and new examples have been added, including cylindrical and spherical pressure vessels, domes, flywheels, notched plates with stress concentration and notch sensitivity, pipes, shafts, stiffened panels, and tanks. Material property tables have been revised and expanded, both in depth and breadth of content. SCILAB source code for most examples is now available on the companion Website [4], and the online software *cadec-online.com* has been updated to reflect the changes and enhancements of this third edition.

Like previous editions, this one remains a textbook for senior-level undergraduate students and practicing engineers. Therefore, the discussion is based on math and mechanics of materials background that is common by the senior year, avoiding tensor analysis and other mathematical constructs typical of graduate school. With the same aim, the sign convention for bending moment and transverse shear has been changed to make it compatible with classical mechanics of materials textbooks that are used in undergraduate courses, thus eliminating a source of confusion.

As in previous editions, the textbook contains much more content than what can be taught in one semester. Therefore, some sections are marked with (*) to indicate that they can be omitted during a first reading, but are recommended for further study and reference.

The textbook now contains 88 fully developed examples (13% increase over the second edition), 204 end-of-chapter problems (22% increase), 49 completely revised and augmented tables including material properties and other practical information (36% increase), 177 figures, and 300 bibliographic citations. The solution's manual (available to instructors) has been completely revamped with detailed solutions and explanations. Since the solution's manual is not available for self-study, a supplementary workbook with a different set of fully solved problems is available for the second edition [5] and will be soon available for the third edition [6]. The solutions in both workbooks make reference to the respective editions of this textbook.

I trust that many students, practicing engineers, and instructors will find this edition to be even more useful than the previous one.

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