Book review

P. I. Kattan and G. Z. Voyiadjis, *Damage mechanics with finite elements: practical applications with computer tools*, Springer, London, 2002, 113 pp. with 1 CD-ROM, £51.50.

There are five chapters in this book, which may be divided into three main parts. The first part is presented in Chapter 1. After a brief review of historical developments in continuum damage mechanics (CDM), a theoretical framework for CDM is presented in a systematic manner. It follows the classical approach of damage representation as originally proposed by Kachanov (1958) but has been generalised to accommodate anisotropic characteristics of damage. Damage evolution is introduced through a set of generalised thermodynamic forces associated with energy dissipation. This part can serve as a reasonable introduction to CDM but readers should not be left with an impression that this is the only form of CDM, as there are different ways of representing damage and describing its evolution mathematically, still in a continuum sense. Significant attention has been paid to the application of CDM to composites.

The second part is on the implementation of the theory in the context of finite elements, as presented in Chapter 2. The development is focused on ductile plastic damage in the bending problem. A plastic node model, as developed previously by one of the authors, is elaborated in detail. The finite element content in this book helps to bring the theory of CDM a step closer to practicality. However, it is felt that the book rushes into computer code a little too swiftly, as presented in the next chapter. As a result, an important aspect is missing, which is a discussion of the various materials properties introduced in the current version of CDM. A few statements on their physical meaning (if any), ways of quantifying or measuring them and the ranges of their magnitudes for typical materials would greatly help readers to appreciate the theory of CDM.

A computer code DNA (damage nonlinear analysis) is provided on the accompanying CD-ROM. Its installation, running, some details of source code and input and output format are explained in Chapters 3–5 and the CD-ROM, as the third part of this book. This could be a useful resource, especially when this book is adopted as a textbook for a relevant subject, or a part of it, for senior undergraduates and postgraduates.

As a whole, this book is certainly of value as an effective introduction to CDM for students and researchers in engineering. A shortcoming is that it is a little too focused in each of the three parts of the book. As a result, readers may find its reference value limited. Perhaps it was the authors' intention to produce a simple and clear introduction to a complex and growing subject.

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