

List of Tables

| | | |
|------|---|----|
| 1.1 | Typical properties of unidirectional composites. | 32 |
| 1.2 | Typical properties of unidirectional composites. | 33 |
| 1.3 | Typical properties of unidirectional (carbon-fiber) composites. | 34 |
| 1.4 | Typical properties of unidirectional (carbon-fiber) composites. | 35 |
| 1.5 | Laminate properties of a general-purpose polyester resin reinforced with E-glass stitched fabric. | 36 |
| 1.6 | Standard Normal cumulative function $P(z)$ and coverage $Q(-z)$. . . | 36 |
| 1.7 | Strength data (in MPa) for Example 1.4. | 37 |
| 1.8 | k- and V-values to compute the A-, B-, and C-basis values as a function of the number of specimens n . Coverage %Q and Confidence %C shown in parenthesis. Use k- and V-values with Normal- and Weibull-distributed data, respectively. | 37 |
| 1.9 | A- and B-basis values for unidirectional T700/2510 (carbon-fiber) composite. | 38 |
| 1.10 | B-basis values for unidirectional (carbon-fiber) composites. | 38 |
| 2.1 | Typical properties of inorganic fibers. | 76 |
| 2.2 | Typical properties of inorganic fibers. | 77 |
| 2.3 | Typical properties of polymer fibers. | 78 |
| 2.4 | Typical properties of polymer fibers. | 78 |
| 2.5 | Weibull shape parameters m of carbon fibers. | 79 |
| 2.6 | Weibull shape parameter m of various fibers and composites. | 80 |
| 2.7 | Fiber strength reduction. | 80 |
| 2.8 | Temperature effect on strength of glass fibers. | 80 |
| 2.9 | Classification of carbon fibers according to modulus. | 81 |
| 2.10 | Properties of natural fibers. Adapted from [83] © 2011, with permission from Elsevier. Additional data from other sources. ³ | 81 |
| 2.11 | Composition of natural fibers. Adapted from [83] © 2011, with permission from Elsevier. ³ | 82 |
| 2.12 | Fiber architecture of various stitched fabrics. | 82 |
| 2.13 | Typical properties of thermoset matrices. | 83 |
| 2.14 | Typical properties of thermoset matrices. | 84 |
| 2.15 | Typical properties of thermoplastic matrices. | 84 |
| 2.16 | Typical properties of thermoplastic matrices. | 85 |

| | | |
|------|--|-----|
| 2.17 | Thermal and mechanical properties of biodegradable polymers, compiled from [54, 81, 237] and other sources. ³ | 85 |
| 3.1 | Advantages and disadvantages of the hand layup process. | 89 |
| 3.2 | Some applications of hand layup. | 90 |
| 3.3 | Advantages and disadvantages of using prepregs. | 91 |
| 4.1 | Coefficients of thermal expansion in Example 4.5. | 127 |
| 9.1 | Geometrical parameters for several plain weave fabrics. | 348 |
| 9.2 | Mechanical properties of fiber and matrix. | 349 |
| 9.3 | Hygrothermo-mechanical properties of the tow for various fabrics. . . | 350 |
| 9.4 | Predicted tow strength for various fabrics. | 350 |
| 9.5 | Hygrothermo-mechanical properties of a fabric-reinforced laminate. . | 351 |
| 9.6 | Comparison of predicted and experimental thermo-mechanical properties. | 351 |
| 9.7 | Comparison between predicted and experimental strength values. . . | 352 |
| 9.8 | Comparison of strength values between unidirectional properties (UD), cross-ply symmetric laminate approximation (CP), and the woven fabric model results. | 352 |
| 9.9 | Comparison of predicted and experimental values of E [GPa] for vinyl ester matrix reinforced with E-glass continuous strand mat (CSM). . | 352 |
| 10.1 | Shear correction factors for common cross-section geometries for beams. | 355 |
| 10.2 | End-restraint coefficients for long column buckling. | 363 |
| 10.3 | Contour definition for Figure 10.5. Used for the computation of contour integrals except $\omega(s)$ | 366 |
| 11.1 | Empirical constants for determination of crippling strain. | 420 |
| 12.1 | Loading conditions. | 434 |
| 13.1 | Strength reduction factor ϕ | 448 |
| 13.2 | FRP reduction factor C_E due to environmental effects. | 451 |
| A.1 | Comparison of predicted and experimental values of compressive strength for various composite materials. | 512 |