

## ERRATA

Z.P. Bažant: *Scaling of Structural Strength*, Hermes-Penton Science, London 2002

### Misprints

- P. 11, in Fig. 1.4b, switch “6” with “1”, and “2” with “1”.
- P. 19, Eq. 1.14: Add  $E$  before “= const.”, and 2 lines above: Replace exponent “2” by exponent “3”.
- P. 19, line below Eq. 1.13, replace  $\sigma_{22}$  by  $\bar{\sigma}_{22}$ . Also, on the line above heading, replace “1983” by “1993”.
- p. 21 Fig. 2.1 Replace  $D'$  by  $D$ .
- p. 27 2nd line from bottom, replace  $u_i$  by  $u_i/D$ .
- P. 31 Fig. 2.5: In the numbers that label the ordinates of the lowest figure, replace the decimal commas with decimal points.
- P. 50, line below Eq. 2.63: Replace  $K$  by  $\bar{K}$ .
- P. 50, Eq. 2.63: Replace  $\bar{\epsilon}''_{ij}$  by  $\frac{1}{2}\bar{K}''_t$ .
- P. 54 2nd line below Eq. 3.2, delete the word “some”.
- P. 54 Last line of first paragraph: Replace  $\sigma$  by bold  $\sigma$
- P. 111. Replace “possesses” by “to possess”.
- P. 188, line 2 should not be indented.
- P. 192, Fig. 9.6 (middle): In the slope indicator, replace “ $r$ ” by “2”.
- P. 200, Fig. 9.7 caption: Replace “for three basic types” by “for the third basic type”.
- P. 202. Insert the word “have” at the end of the first line of the second paragraph.
- P. 208, line below Eq. 9.108: Replace “(9.73)” by “(9.75)”.

### Minor Corrections

- P. 17, lines 3-4 of Sec. 1.7: Replace “Buckingham’s II theorem (” by “the II theorem (Riabouchinski 1911-12,”
- P. 231. Insert: “Riabouchinski (1911-12). Annual Report. *British Advisory Committee for Aeronautics*, Abstract No. 134, p. 260 (also *L’Aerophile*, Sept. 1, 1911).”

### Essential Corrections and Additions

- P. 18. Above the second line from bottom, the following paragraph has accidentally been skipped and must be inserted:

We already know that the scaling law must be a power law. So we set

$$\bar{u}_i = \lambda^{m+1}u_i \quad (a)$$

where  $m$  is an unknown exponent. Substituting this into the foregoing dimensionless expression for strains, we get

$$\bar{\epsilon}_{ij} = \lambda^m(\partial_j u_i + \partial_i u_j)/2$$

From this and the rest of the preceding dimensionless equations, the following transformation rules then ensue

$$\bar{\epsilon}_{ij} = \lambda^m \epsilon_{ij}, \quad \bar{\sigma}_{ij} = \lambda^m \sigma_{ij}, \quad \bar{\sigma}_N = \lambda^m \sigma_N, \quad \bar{p}_i = \lambda^m p_i, \quad \bar{f}_i = \lambda^{m-1} f_i, \quad \bar{u}_i = \lambda^{m+1} u_i \quad (b)$$

To determine  $m$ , we need to consider the material properties, especially the failure criterion.

- P. 194: Below Eq. 9.46, insert the phrase: “(except that the condition  $\lim_{D \rightarrow 0} d\sigma_N/dD < 0$  for the cohesive crack model is not satisfied).”
- P. 203. At end of line 2 below Eq. 9.81, insert: “However, to match the asymptotics of the cohesive crack model (finite slope  $d\sigma_N/dD$ , Sec. 2.12), it is necessary that  $D_1 > D_0$ .”
- P. 224–226. On line 5 above Eq. 10.19, delete  $\Phi_{ijk}$  (not a homogeneous function of degree 1); in Eqs. 10.20, 10.24 and line 3 on p. 225 replace exponent  $3/2$  with  $1/2$ ; in Eq. 10.19 exponent  $-(1 + p/q)$  with  $-p/q$ ; in Eq. 10.19 and second line of p. 225, delete 1.

FURTHER CORRECTIONS AND IMPROVEMENTS FOR THE 2ND EDITION (2004):

Please replace Fig. 2.6, p. 34, with figure ..... and change the caption as follows: .....

p. 43, second line above Eq. 2.45, replace "Noting" by: Setting  $\sigma = \text{constant}$  (strength limit) =  $f_{r\infty}$  and noting

p. 43, line 5 from bottom: replace  $D_b/2$  by:  $2D_b$ ,  
and do the same on the last line of this page.

p. 43, Eq. 2.63: Replace  $\bar{\epsilon}''_{ij}$  by:  $\frac{1}{2}\bar{K}''_t$

p. 43, line below Eq. 2.63, after "where" insert:  $\bar{\sigma}' = -\bar{w}^p$ , and

p. 54, line 6 below Eq. 3.7, delete ")" before "(Freudenthal"

p. 82, line 6 from bottom, delete misplaced "f4"

p. 194, line 4 below Eq. (b), after "concrete" insert: (because  $d\sigma_N/dD = 0$  for  $D = 0$ ).

p. 194 replace equation label "(b)" by: "(9.46a)"

p. 205, line above Eq. 9.75, delete the word "equally"

p. 203, line below Eq. 9.81, insert before "and": which is not compatible with the cohesive crack model (see Sec. 2.12),

p. 222, top 2 lines, replace "tensors  $\boldsymbol{\eta}$  and" by: tensor  $\boldsymbol{\eta}$  and degree 0 of tensor

p. 222, remove the minus in the exponent in the equation on the left (but not on the right)

p. 223, line 3 below Eq. 10.17, replace " $\sigma_N \dots = 0$ ." by:  $\bar{\Phi}_{ijk} = 0$ , which causes that the term with  $K$  in Eq. 10.15 dominates, and thus  $\sigma_N \propto D^{-2}$  for  $K < \infty$  and  $\sigma_N \propto D^{-2+pq} \propto D^{-3/2}$  for  $K \rightarrow \infty$ , i.e., incompressible material).

p. 224, lines 5 and 4 above Eq. 10.19, replace " $\eta$  and  $\Phi_{ijk}$  are ..., we" by:  $\bar{\epsilon}_{ij} = \epsilon_{ij} = w\hat{\epsilon}_{ij}$ ,  $\bar{\epsilon} = \epsilon = w\hat{\epsilon}$  and  $\bar{\eta}_{ijk} = w\eta_{ijk}$ ,  $\eta$  is a homogeneous function of degree 1 of  $\boldsymbol{\eta}$  and  $\Phi_{ijk}$  is a homogeneous function of degree 0 of  $\boldsymbol{\epsilon}$ , we

Also, on line 4 above Eq. 10.19, replace " $w\hat{\Phi}_{ijk}$ " by:  $\hat{\Phi}_{ijk}$

In Eq. 10.19, replace exponent  $-(1 + p/q)$  by exponent  $-p/q$

Second line above Eq. 10.20, after "(10.19)", insert: with  $p = 1, q = 2$

p. 226, line 2, replace  $1 + (p/q)$  by:  $p/q$

and on line 3, replace " $3/2$ " by:  $1/2$

p. 225 Delete the entire 2nd, 3rd and 4th paragraphs (beginning with "Now it.." and ending with ".. reasonable." and replace them by: From Eq. (10.20), we see that the asymptotic load deflection curve for  $D \rightarrow 0$  begins with a vertical tangent (i.e., infinite elastic stiffness). In other words, the elastic part of response for  $D \rightarrow 0$  is not captured by this theory.

p. 226, line above Eq. 10.23, replace " $= 1/2$ " by:  $= 2$ )

In Eq. 10.24, replace exponent  $3/2$  by exponent  $1/2$ , and replace  $\bar{\epsilon}$  in denominator by:  $\epsilon$

p. 227, Fig.10.2, delete the two curves of  $P$  versus  $w$  at the bottom of figure (keeping only the top diagram), and modify the caption by dropping "(a)" and the entire passage "(b) strange ... profile."

p. 228, line 3 below heading, replace ", characterized by locking, seems unreasonable" by: gives excessive size effect and asymptotically vanishing elastic part of response.

on lines 4 and 5, replace "the present" by: it follows that the

on line 6, delete "in the future" and add at the end: Such modified theory is essentially identical to the TNT (Taylor-based nonlocal) theory developed independently (based on different arguments) by Gao et al. (2000) as a replacement of their original theory analyzed in this section.

AN ADDENDUM ON THE LATEST DEVELOPMENTS IS ALSO APPENDED TO THE 2nd EDITION