Known Typographical Errors in the First Edition, First Printing of Turbulence Modeling for CFD by D. C. Wilcox

These are all of the known typographical errors as of March 16, 2009.

1. Page 13, Equation (2.9): Replace "$U_i(\mathbf{x})$" by "$U_i(\mathbf{x}, t)$".
2. Page 26, next to last paragraph: Replace "$0.499 v_{th} \ell_{mfp}$" by "$0.499 \rho v_{th} \ell_{mfp}$".
3. Page 34, paragraph 2, line 2: Replace "dependent variables" by "independent variables".
4. Page 42, Equation (3.88): Replace "y" by "η".
5. Page 42, Equation (3.89): The limiting value of the function is missing and "y" should be replaced by "η". The correct equation is
$$\frac{d}{d\eta}\left[\frac{1}{\eta^j}\frac{dF}{d\eta}\right] \eta \to 0 \qquad \text{as} \qquad \eta \to 0$$
6. Page 49, Equation (3.109): The equation should be replaced by
$$F_{Kleb}(y;\delta) = \left[1 + 5.5\left(\frac{y}{\delta}\right)^6\right]^{-1}$$
7. Page 50, Equation (3.114): The value of κ should be 0.40.
8. Page 52, Equation (3.124): The value of κ should be 0.40.
9. Page 67, Figure 3.18: Replace "Driver" by "Samuel and Joubert".
10. Page 80, Equation (4.22): The factor "$[1 - f_{t2}]$" should be omitted.
11. Page 98, Table 4.1: For the round jet, the value of S_k should be $2\mathcal{U}$.
12. Page 99, first paragraph, fourth line: Replace "$y/$x" by "y/x".
13. Page 107, Equation (4.92): Replace "Re_{δ^*}" by "$u_\tau \delta^* / \nu$".
14. Page 107, just below Equation (4.92): Replace "momentum thickness" by "displacement thickness".
15. Page 107, just above Equation (4.94): Replace "$Re_{\delta^*} \gg 1$" by "$u_\tau \delta^* / \nu \gg 1$".
16. Page 107, Equation (4.94): Replace "Re_{δ^*}" by "$u_\tau \delta^* / \nu$".
17. Page 123, Equation (4.157): Replace "u" by "U".
18. Page 140, Equation (4.186): The value for $C_{\epsilon 1}$ should be 1.55, rather than 1.45.
19. Page 147, Equation (4.196): ρ should not appear in the equation—it should be as follows.
$$U\frac{\partial U}{\partial x} + V\frac{\partial U}{\partial y} = \frac{\partial}{\partial y}\left[(\nu + \nu_T)\frac{\partial U}{\partial y}\right]$$
20. Page 147, Equation (4.198): Replace "μ_T" by "ν_T".
21. Page 147, Equation (4.201): Replace "μ_T" by "ν_T".
22. Page 173, Equation (5.4): Replace "$\frac{1}{\bar{\rho}}$" by
$$\frac{1}{\bar{\rho}} \lim_{T \to \infty} \frac{1}{T}$$

23. Page 186, second paragraph, fourth line: Replace "nearly identical" by "similar".

24. Page 189, Table 5.1: All Mach numbers should be multiplied by $\sqrt{2}$. The correct table is as follows.

	Boundary Layer		Mixing Layer	
M_∞	$\xi^* = 0$	$\xi^* = 1$	$\xi^* = 0$	$\xi^* = 1$
0	0	0	0	0
1	0.086	0.086	0.255	0.225
2	0.161	0.151	0.437	0.321
3	0.211	0.191	0.543	0.346
4	0.246	0.218	0.600	0.359
5	0.270	0.242	0.641	0.376

25. Page 201, paragraph just below Equation (5.110), tenth line: Replace "1.86" by "-1.36".

26. Page 217, just below Equation (6.6): Replace "with $\beta_R \approx 11.3$. This is nearly identical to $\cdots$" by "with $\beta_R \approx 8.8$. This is very similar to $\cdots$".

27. Page 231, Equation (6.60): Replace the left hand side of the equation

$$\frac{\partial \tau_{ij}}{\partial t} + U_k \frac{\partial \tau_{ij}}{\partial x_k} = \cdots$$

by

$$\frac{\partial \tau_{ij}}{\partial t} + \frac{\partial}{\partial x_k}\left(U_k \tau_{ij}\right) = \cdots$$

28. Page 234, Equation (6.66): Replace the left hand side of the equation

$$\frac{\partial \tau_{ij}}{\partial t} + U_k \frac{\partial \tau_{ij}}{\partial x_k} = \cdots$$

by

$$\frac{\partial \tau_{ij}}{\partial t} + \frac{\partial}{\partial x_k}\left(U_k \tau_{ij}\right) = \cdots$$

29. Page 257, last line on page: Replace "all four of the high-amplitude cases" by "four of the high-amplitude cases".

30. Page 261, end of first paragraph: Delete the space between the word "flows" and the period at the end of the sentence.

31. Page 268, just above part (b) of Problem 6.1: Replace the equation for ω^+ by

$$\sigma \nu_T^+ \frac{\partial}{\partial y^+}\left[\nu_T^+ \frac{\partial \omega^+}{\partial y^+}\right] = \beta k^+ \omega^+ - \alpha \frac{\omega^+}{k^+}$$

32. Page 268, just above the NOTE in part (b) of Problem 6.1: Replace the equation for b by

$$b = -\frac{9/2}{2 - \sigma^* \kappa^2 / \sqrt{\beta^*}}$$

33. Page 268, within the NOTE in part (b) of Problem 6.1: Replace the equation for $\sigma\kappa^2$ by

$$\sigma \kappa^2 \;=\; (\beta/\beta^* - \alpha)\sqrt{\beta^*}$$

34. Page 268, last line: Replace the equation for β_R by

$$\beta_R \approx 8.8$$

35. Page 281, fourth line below Equation (7.28): Replace "Cazalbou, Spalart and Bradshaw (1993)" by "Cazalbou, Spalart and Bradshaw (1994)".

36. Page 284, sixth line below Equation (7.50): Replace "Cazalbou, Spalart and Bradshaw (1993)" by "Cazalbou, Spalart and Bradshaw (1994)".

37. Page 285, sentence just below Equation (7.52): Replace "subject the following" by "subject to the following".

38. Page 285, Equation (7.55): Replace "$y - \delta$" by "$\delta - y$".

39. Page 286, last two paragraphs: The names Neumann and Dirichlet are inverted throughout. The last two sentences of the next to last paragraph should read as follows.

    "That is, specified values at the edge are of the Dirichlet type while zero-gradient conditions are of the Neumann type. Almost universally, convergence of iterative schemes is much slower with Neumann conditions than with Dirichlet conditions."

    Also, in the last paragraph, the next to last sentence should read:

    "Once k_e and ω_e are determined from Equations (7.56) and (7.57), it is then possible to specify Dirichlet-type boundary conditions that guarantee zero normal gradients. "

40. Page 294, second paragraph, second line: the reference, "Lilley (1965)", should be "Lilly (1965)".

41. Page 298, first line: Delete the word 'inviscid'

42. Page 300, Equation (7.119): A minus sign has been omitted in the matrix element in row 3, column 4. The correct entry is

$$-(\gamma - 1)\tilde{u}$$

43. Page 309, Problem 7.7(b): The exponent for ω_{m+1} is missing. The correct result is:

$$\frac{\delta\omega^i}{\delta\omega^{i-1}} = \frac{(\psi_\omega - 1) - \alpha(\partial U/\partial y)^2/(\beta\omega_{m+1}^2)}{\psi_\omega + U(4\omega_m - \omega_{m-1})/(\omega_{m+1}^2\Delta x)}$$

44. Page 310, Problem 7.10: The third element of the vector **F** should have a minus sign in front of the last term, i.e., it should be

$$\gamma Q_2 Q_3/Q_1 - (\frac{\gamma - 1}{2})Q_2^3/Q_1^2 - (\gamma - 1)Q_2 Q_4/Q_1$$

45. Page 326, first paragraph, next to last sentence: Replace "have been even" by "have even been"

46. Page 333, just above Equation (A.12): change "1 x m row vector" to "m x 1 column vector".

47. Page 340, Equation (B.15): The exact solution is

$$F(s;\delta) = \frac{e^{\alpha(1-s)} - e^{\alpha - \beta s/\delta}}{1 - e^{\alpha - \beta/\delta}}$$

    where

$$\alpha = \frac{1 - \sqrt{1 - 4\delta}}{2\delta} \quad \text{and} \quad \beta = \frac{1 + \sqrt{1 - 4\delta}}{2}$$

48. Page 416, last paragraph, fourth line: Insert a space between "c_f" and the word "or".

49. Page 427, Equation (D.33): The value for $C_{\epsilon 1}$ should be 1.55, rather than 1.45.

50. Page 438, Cazalbou, et al. reference: The complete reference is

    Cazalbou, J. B., Spalart, P. R. and Bradshaw, P. (1994), "On the Behavior of Two-Equation Models at the Edge of a Turbulent Region," *Physics of Fluids*, Vol. 6, No. 5, pp. 1797-1804.

51. Page 441, Fan, et al. reference: The complete reference is

    Fan, S., Lakshminarayana, B. and Barnett, M. (1993), "A Low-Reynolds Number k-ϵ Model for Unsteady Turbulent Boundary Layer Flows," *AIAA Journal*, Vol. 31, No. 10, pp. 1777-1784.

52. Page 448, Narayanswami, et al. reference: The complete reference is

    Narayanswami, N., Horstman, C. C. and Knight, D. D. (1993), "Computation of Crossing Shock/Turbulent Boundary Layer Interaction at Mach 8.3," *AIAA Journal*, Vol. 31, No. 8, pp. 1369-1376.

53. Page 455, Yang and Shih reference: The complete reference is

    Yang, Z. and Shih, T.-H. (1993), "New Time Scale Based k-ϵ Model for Near-Wall Turbulence," *AIAA Journal*, Vol. 31, No. 7, pp. 1191-1198.