Discussion "Pressure Drop During Refrigerant Condensation Inside Horizontal Smooth, Helical Microfin, and Herringbone Microfin Tubes" (Olivier, J. A., Liebenberg, L., Kedzierski, M. A., and Meyer, J. P., 2004, J. Heat Transfer, 126(5), pp. 687–696)

M. M. Awad
Faculty of Engineering and Applied Science,
Memorial University of Newfoundland,
St. John's,
Newfoundland, A1B 3X5 Canada
e-mail: awad@engr.mun.ca

In the paper "Pressure Drop During Refrigerant Condensation Inside Horizontal Smooth, Helical Microfin, and Herringbone Microfin Tubes" (Olivier, J. A., Liebenberg, L., Kedzierski, M. A., and Meyer, J. P., 2004, J. Heat Transfer, **126**(5), pp. 687–696), there are some errors in equations. The errors will be summarized first. After that, a general expression for the liquid-only friction factor f_{Lo} will be presented because the general form presented in this paper, Eq. (16), is not valid for helical microfin tubes.

Equation (4) for the momentum pressure drop Δp_m must be written as follows:

$$\Delta p_m = G^2\left\{\left[\frac{(1-x)^2}{\rho_L(1-\varepsilon)}+\frac{x^2}{\rho_V\varepsilon}\right]_{\mathrm{out}}-\left[\frac{(1-x)^2}{\rho_L(1-\varepsilon)}+\frac{x^2}{\rho_V\varepsilon}\right]_{\mathrm{in}}\right\} \quad (4)$$

The error in Eq. (4) is clearly a typographical error considering that the exponent a is not in the Nomenclature and the parameter a is not used elsewhere in the manuscript. In addition, the model will faithfully predict the measurements given in the original paper once all of the other corrections have been incorporated.

In Eq. (7), for the definition of the Froude rate, it is better to use the subscript V not v for vapor to use a consistent style of writing the parameters in the whole paper

$$Ft = \left[\frac{G^2x^3}{(1-x)\rho_V^2 g D_i}\right]^{1/2} \quad (7)$$

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The line after Eq. (9) must be written as "with the two-phase multiplier being that of Souza et al. [16]." Reference [16] is Souza, A. L., Chato, J. C., Wattelet, J. P., and Christoffersen, B. R., 1993, "Pressure Drop During Two-Phase Flow of Pure Refrigerants and Refrigerant-Oil Mixtures in Horizontal Smooth Tubes," *ASME Heat Transfer With Alternate Refrigerants, HTD*, **243**, pp. 35–41.

Equation (10) is applicable only for the range $\mathrm{Fr}_L > 0.7$, where the Froude number is defined as

$$\mathrm{Fr}_L = \frac{G^2}{\rho_L^2 g D_i}$$

Equation (12) for helical microfin tubes must be written as follows:

$$f_{\mathrm{Lo}} = 0.046\mathrm{Re}_L^{-0.2}\left(\frac{D_i}{D_e}\right)^{-1}\left(\frac{A}{A_n}\right)^{-0.5}(\sec\beta)^{-0.75} \quad (12)$$

where

$$\frac{A}{A_n} = 1-\frac{4ent}{\pi D_i^2\cos\beta} \quad (13)$$

Equation (14) for herringbone microfin tubes must be written as follows:

$$f_{\mathrm{Lo}} = 0.046\mathrm{Re}_L^{-0.2}\left(\frac{D_i}{D_e}\right)^{-1}\left(\frac{A}{A_n}\right)^{-0.5}(2\sec\beta)^{-1.1} \quad (14)$$

where

$$\frac{A}{A_n} = 1-\frac{2ent}{\pi D_i^2\cos\beta} \quad (15)$$

The general form of Eq. (16) is not valid for helical microfin tubes because the term ent is multiplied by 1 in Eq. (16), while the term *ent* is multiplied by 4 in Eqs. (12) and (13).

Based on Eqs. (12)–(15), the following general form for helical microfin tubes and for herringbone microfin tubes is presented as

$$f_{\mathrm{Lo}} = 0.046\mathrm{Re}_L^{-0.2}\left(\frac{D_i}{D_e}\right)^{-1}\left(1-\frac{4ent}{\pi D_i^2 X\cos\beta}\right)^{-0.5}(X\sec\beta)^{-Y}$$

For helical microfin tubes,

$$X = 1$$

$$Y = 0.75$$

For herringbone microfin tubes,

$$X = 2$$

$$Y = 1.1$$

The term $4/X$ in the general form for helical microfin tubes and for herringbone microfin tubes can be written in different ways, such as 2^{3-X}, $6-2X$, or $3!-2^X$.

