structed in order to experimentally verify their extension? In a y e case, one must emphasize that their effort was still productive in providing a quantified basis for concluding that wall inertial (not elastic) effects are usually negligible. Secondly, it is not at all clear how one should choose the characteristic velocity used in the Mach and Reynolds numbers to non-dimensionalize the results. In solving a real problem, one needs a dimensional result. The authors' remark that "U = some characteristic velocity such as the average velocity of the total input pulse or, where appropriate, its root-mean-square value." When is the rms value appropriate—just for pure sinusoidal or for periodic waveforms? What is the average or rms value of a step input? Why use the average value of the pulse in Fig. 5 to predict the peak values in Fig. 6? Would their model predict no attenuation of an arbitrary aperiodic signal whose overall average velocity was zero? The choice of U seems far from arbitrary since the results (see Figs. 4 and 6) are strongly dependent on Reynolds number.

**Author's Closure**

The authors wish to thank Captain J. T. Karam, Jr., for his queries and observations which are well taken and elucidated in the following.

For the usual waterhammer problem encountered in engineering practice, inertial effects are likely to be unimportant and, hence, the first term of equation (10) can be neglected: the balance two terms will then modify the acoustic speed to give the phase speed according to Korteweg (cf. equation (27)). However, there are two instances when inertial effects become important, viz.

(a) For periodic disturbances where the forcing frequency is close to or greater than the natural radial frequency of the waveguide (cf. equations (26) and (11)), and

(b) For isolated pulses when the pulse duration is of the same order or less than the period of natural radial oscillations of the waveguide.

Contrary to the inference made by Captain Karam, Jr., the choice of the characteristic velocity, U, is arbitrary. On examining equations (42) and (43), it is seen that the Reynolds number always appear in the combined form $\frac{M'z}{R}$ which expands to

$$M'z = \frac{U}{c'} \frac{z}{D} \frac{v}{UD}$$

(1)

where, $D_n$ is the dissipation number defined by Goodson, et al. [8]. Similarly, U in the Mach number appearing elsewhere in the results gets cancelled on dimensionalizing. Hence, it is only for convenience that the average of the input is recommended for use with isolated pulses (including step inputs since the average as well as the rms are identical to the step magnitude), and the rms for periodic disturbances or pulses with zero averages.

For dimensional computations, equations (42) and (43) can be readily reduced to

$$p = \rho c' \omega_n (1 + \Phi) \frac{1}{2} c^2 \left( \frac{z}{c'} \right)^{n} \int_{0}^{u} \int_{n}^{u} J_f (1 + \Phi) [\omega_n (l - v)]$$

- Erfc $\left( \frac{z}{c'} \right) \left( \frac{z}{c'} \right)^{1/2} \left( \frac{z}{c'} \right)^{1/2} \left( \frac{z}{c'} \right)^{1/2} \left( \frac{z}{c'} \right)^{1/2}$

$du \cdot f(l - v) du \ (i)$

and

$$p = \rho c' \left( \frac{z}{c'} \right) \left( \frac{z}{c'} \right)^{1/2} \left( \frac{z}{c'} \right)^{1/2} \left( \frac{z}{c'} \right)^{1/2} \left( \frac{z}{c'} \right)^{1/2} \left( \frac{z}{c'} \right)^{1/2} \left( \frac{z}{c'} \right)^{1/2} \left( \frac{z}{c'} \right)^{1/2} \left( \frac{z}{c'} \right)^{1/2}$

$du \cdot f(l - v) du \ (ii)$

respectively.

**An Approximate Method for the Solution of a Class of Nonlinear Equations In Fluid Mechanics and Magnetohydrodynamics**

N. C. JAIN. Recently Nath has developed an approximate method to obtain a closed form solution of a class of nonlinear two point boundary value problems. For practical purposes the method is very useful because of its simplicity. The present note is concerned with some corrections in a few equations of reference [1] which have been observed.

(i) Equation (27), as such, does not give equation (28) when integrated under the proposed boundary conditions. The correct form of equation (27) is the following:

$$P''(\eta) = \frac{1}{2} \left( \lambda_1 + \left( 3 + 2\alpha \eta \right) \lambda_2 + \left( 1 + a \eta \right)^2 \right) \exp (-2\alpha \eta) + \left( \lambda_1 + \left( 2 + a \eta \right) \lambda_2 \right) \exp (-a \eta) \ (27)$$

(ii) Although equation (28) is a particular case of equation (31), when $\alpha = 2$ and $\beta = 1$, it is noted that the same is not obtained unless the following correct expression for equation (31) is used:

$$P''(0) = (11 \alpha + 35 \beta + 24 S)\alpha^2 - 2(\beta + S)(\alpha + 5 \beta + 4 S)\alpha^3$$

$$- \left( \beta + S \right) (\alpha + \beta) / 16 \beta \ (31)$$

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