where A_1, B_1 and A_2, B_2 are the calibration constants for wires 1 and 2, respectively. By performing a linear analysis similar to that of a single wire, we obtain expressions for u_i and v_i as

$$u_i = ae_{1i} + be_{2i} \tag{8}$$

$$v_i = ae_{1i} - be_{2i} \tag{9}$$

where

$$a = \frac{2\bar{E}_1\sqrt{\bar{U}}}{B_1} \tag{10}$$

and

$$b = \frac{2\bar{E}_2\sqrt{\bar{U}}}{B_2} \tag{11}$$

Equations (8) and (9) indicate that u_i and v_i are functions of e_{1i} and e_{2i}. The spectra of u_i and v_i are obtained by taking the Fourier transform of the autocorrelation. From Eqs. (8) and (9), we can write

$$S_u(f) = a^2 S_{e1}(f) + b^2 S_{e2}(f) + ab\,[S_{e1e2}(f) + S_{e2e1}(f)] \tag{12}$$

$$S_v(f) = a^2 S_{e1}(f) + b^2 S_{e2}(f) - ab\,[S_{e1e2}(f) + S_{e2e1}(f)] \tag{13}$$

where $S_{e1}(f)$ and $S_{e2}(f)$ are the spectra of e_1 and e_2, respectively, and $S_{e1e2}(f)$ and $S_{e2e1}(f)$ are the cross-spectra of e_1 and e_2.

The foregoing relations were verified by analyzing turbulence data in the central region of a circular duct obtained with a cross-wire probe. The spectra of the fluctuating voltages were obtained by employing the correlogram technique on the digitally sampled signals. Also from the voltages, the velocities were computed using relations (6) and (7) and the spectra of the velocities using the correlogram method. The results are shown in Fig. 2. The e_1e_2 and e_2e_1 spectra have a significant influence on the spectra of u and v.

Conclusion

The relation between spectra of hot-wire fluctuating voltages and the spectra of velocity fluctuations for both single- and two-wire probe were derived. The results were verified by applying them to experimental data for flow in a circular duct. It was found that in the case of a two-wire probe, the cross-spectra of e_1 and e_2 play an important role.

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Errata

Linearized Euler Predictions of Unsteady Aerodynamic Loads in Cascades

Kenneth C. Hall and William S. Clark
Duke University, Durham, North Carolina 27706

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DURING typesetting of this paper, several errors were inadvertently introduced. We regret these errors.

Page 545

Column 2, line 17 should read, "These modes are spurious computational modes with no physical counterparts."

Page 548

Column 2, line 15 should refer to Ref. 27 rather than Ref. 26.

Page 550

References 22 through 27 should be renumbered as follows:

[22]Hall, K. C., and Lorence, C. B., "Calculation of Three-Dimensional Unsteady Flows in Turbomachinery Using the Linearized Harmonic Euler Equations," American Society of Mechanical Engineers, 37th International Gas Turbine and Aeroengine Congress and Exposition, Paper 92-GT-136, Cologne, Germany, June 1–4, 1992.

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