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Technical Comments

Comment on "Inverse Solutions of the Prandtl–Meyer Function"

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REFERENCE 1 presents exact and approximate inversion formulas of the well-known Prandtl–Meyer function $\nu(M)$. Their one exact formula is for $\gamma = (5/3)$, where γ is the ratio of specific heats. The formula is based on solving a cubic equation. A simpler, exact inversion formula for $\gamma = (5/3)$ can be found in Ref. 2. This formula, and one for $\gamma = (5/4)$, was originally published in Ref. 3.

References

[1]Özcan, O., Edis, F. O., Aslan, A. R., and Pinar, İ., "Inverse Solutions of the Prandtl–Meyer Function," *Journal of Aircraft*, Vol. 31, No. 6, 1994, pp. 1422–1424.

[2]Hayes, W. D., and Probstein, R. F., *Hypersonic Flow Theory*, Academic, New York, 1959, p. 264.

[3]Probstein, R. F., "Inversion of the Prandtl-Meyer Relation for Specific Heat Ratios of 5/3 and 5/4," *Journal of the Aeronautical Sciences*, Vol. 24, 1957, pp. 316, 317, 632.

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Reply by the Authors to G. Emanuel

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WE would like to thank Prof. Emanuel for his interest and for his comment on our recent paper,[1] which included an exact inversion formula of the Prandtl–Meyer function for a specific heat ratio of $\gamma = 5/3$. After presenting our exact inversion formula in Ref. 2, we made an unfruitful effort to determine whether similar inverse relations were reported in the literature. We failed to discover the work of Probstein[3] whose exact inversion formula for $\gamma = 5/3$ is different than ours.

For those who have not read Ref. 1, we would like to point out that our paper also presents various approximate inversion formulas, including two for a diatomic gas ($\gamma = 7/5$). Additionally, Ref. 1 compares the accuracies and computation times of several methods used for the inverse solution of the Prandtl–Meyer function. The validity of the conclusions in our paper is not affected by our unawareness of the inverse solutions obtained by Probstein.[3]

References

[1]Özcan, O., Edis, F. O., Aslan, A. R., and Pınar, İ., "Inverse Solutions of the Prandtl-Meyer Function," *Journal of Aircraft*, Vol. 31, No. 6, 1994, pp. 1422–1424.

[2]Özcan, O., Aslan, A. R., Edis, F. O., and Pınar, İ., "Solution of Supersonic Flow by the Method of Characteristics," *Proceedings of the 8th Congress of National Mechanics* (Antalya, Turkey), ITU Matbassi, Istanbul, Turkey, 1993, pp. 489–498.

[3]Probstein, R. F., "Inversion of the Prandtl-Meyer Relation for Specific Heat Ratios of 5/3 and 5/4," *Journal of the Aeronautical Sciences*, Vol. 24, No. 4, 1957, pp. 316, 317, 632.

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