Error terms corresponding to the foregoing numerical approximations may be found in the cited report.

DISCUSSION

Gordon J. Van Wylen[4]

Two questions can be raised regarding this interesting and stimulating paper. All of the analytic study is based on the assumption that the steam, both in the superheat and two-phase regions, is an ideal gas with constant specific heat. This is a reasonable assumption in the superheat region at low pressures, but the validity of this assumption can be questioned both at high pressures in the superheat regions and in the two-phase region. Perhaps it is significant that the comparisons between the IBM 704 program and the analytical results which are cited are all at low pressures. It is noted that the agreement between the IBM 704 program and the analytic study is less at 50 psia than at 10 psia. How do these compare at pressures above 1000 psia?

The second question involves the basic validity of taking an expression which was derived assuming constant specific heat (and therefore constant γ) and differentiating it to find the effect of variable γ. This raises the question of the general applicability of this approach and whether or not the rather good agreement between the IBM 704 program and the analytical studies is somewhat coincidental.

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Author's Closure

I would like to express my appreciation to Professor Van Wylen for his interest in this paper and for his several appropriate questions. With regard to the fluids' adherence to the perfect gas relationships during the processes under consideration, I have found excellent agreement both in the superheated and wet steam regions. At the higher pressure levels in the superheated region, a comparison of several points at pressures up to 1000 psia has shown close agreement with the several plotted relationships. To quote one point, consider it to be at low entropy with an inlet pressure of 1000 psia and at a temperature of 740 F, equation (14) indicates that c = 1826.38 ft/sec, the computer results yield 1828.80 ft/sec.

The general concern over the differentiation of an expression with respect to a term considered constant is certainly justified; acknowledgment of this fact may be found in the Introduction and Appendix B. However, the point remains as to whether this procedure may yield correct trends when examined for changes in this pseudo-constant. The affirmative view is supported by the results of the paper's comparison points.