4. We have extensively discussed the uncertainties in the predicted target reactor performance parameters. This, of course, is the main subject of Ref. 1, which provoked the present deliberation. In this final remark we wish to recall that important as the uncertainties are, the very parameter values about which these uncertainties are spread are at least just as important. And as far as the parameter predictions are concerned, by our discursive reasoning and by the force of all our arguments, it should by now be quite clear that the predictions by the bias-factor method are definitely less reliable than the adjusted parameter values, which, to return to an early quotation, indeed "rest on a firm theoretical and mathematical foundation."

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Response to "Comment on 'Error Due to Nuclear Data Uncertainties in the Prediction of Large Liquid-Metal Fast Breeder Reactor Core Performance Parameters'"

Wagschal and Yeivin[1] assert that the predictions by the bias-factor method are definitely less reliable than by the adjusted parameter values and state that the recourse to the bias-factor method would have been justified only when the covariance and sensitivity data are lacking or are seriously in doubt. "The bias-factor method or the adjustment" has been a theme of years of argument in the neutronics community.

We believe that the adjustment is a very powerful tool to improve the predictive accuracy of performance parameters, but the method is not always almighty. We also believe that the bias-factor method is also an indispensable tool in design work for the following reasons.

The measured sample worths are not free from the problem of the "central discrepancy." The control rod worth inevitably involves the uncertainty associated with the delayed neutron data (β_{eff}). The use of these data as input for the adjustment might distort the adjusted cross sections and consequently degrade the accuracy of predictions of other performance parameters such as criticality, power distribution, etc. In order to avoid this degradation, it is possible to lessen the weights for these data. This is, however, equivalent to discarding the information from the experiment. On the other hand, the bias-factor method can utilize this information without affecting other parameters, although uncertainties associated with β_{eff} and others are included in the predicted values.

It is desirable that the cross-section library be unchanged during the design once it has been started. The library may be either nonadjusted or adjusted. In any case, we have to cope with the addition of new integral data and the revision of old data. This is accomplished by the bias-factor method. These are the reasons why we believe that the bias-factor method will not be abandoned even in the future. As long as the bias-factor method continues to be used, it is necessary to provide a method of error evaluation after the bias factor is applied.

The method presented in Ref. 2 can also be utilized in the selection of the best mock-up system. Let us assume that there are many candidates for the mock-up of a future power reactor. The best mock-up system is the one that minimizes the variance of performance parameter, namely the diagonal term of matrix **V** of Eq. (7) in Ref. 2.

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[1] J. J. WAGSCHAL and Y. YEIVIN, *Nucl. Sci. Eng.*, **86**, 121 (1984).

[2] T. KAMEI and T. YOSHIDA, *Nucl. Sci. Eng.*, **84**, 83 (1983).