CORRESPONDENCE.

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To the Editor of the AËRONAUTICAL JOURNAL.

DEAR SIR,—The article on helicopters by Mr. J. Case, in the October issue, mentions a serious discrepancy in calculating the thrust at zero advance by the multiplane interference theory, according as the corrections are estimated from the experimental data of R. and M. 639, or are calculated by the vortex theory of aerofoils as in R. and M. 752. In the first case a thrust of 2,000lb. per blade was obtained, while in the second case the value was 370lb., and this last figure was in agreement with model tests of the airscrew. The following notes are an attempt to account for this discrepancy.

The experimental data of R. and M. 639 were obtained with aerofoils of aspect ratio 6, while the calculations for the helicopter were based on the actual aspect ratio 3 of the blades. Calculations with aspect ratio 6, however, would give a thrust of 700lb. instead of 370lb. as obtained with aspect ratio 3.

In the second place the calculations made on the vortex theory have shown that, owing to errors of extrapolation, the experimental results of R. and M. 639 may be considerably in error. This error depends on the span-gap ratio of the series of aerofoils, being negligible when this ratio is unity and rising to 5 per cent. when the ratio is 6. In the case of the helicopter under discussion this ratio was as high as 33 and the error of extrapolation can therefore be estimated as of the order of 25 per cent. If this correction is made the thrust per blade is found to be 750lb. instead of 2,000lb. and this figure is in reasonable agreement with the estimate made by use of the vortex theory.

It appears from this discussion that if the multiplane interference theory is *to be used with success the correction* factors should be calculated by the vortex theory as in R. and M. 752 and that the mean aspect ratio of the blades should be used.

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Yours faithfully,
H. GLAUERT.

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