The continued turning of a faulty engine may in these circumstances produce such vibration as to force a descent.

This is, of course, merely an argument in favour of making each pair of engines drive a single large airscrew by means of gearing; with such a layout it is possible to use engines all of one hand but at the same time to retain inward turning screws and a simple design of gearing.

The question of control at low speeds is certainly of vital importance. War machines have sacrificed this feature to the manœuvrability at high speeds necessary for fighting purposes.

There are certain aircraft to-day which have to be landed at speeds 5—10 miles per hour faster than necessary solely on account of poor control at the lower velocity. Observation of the slow speed tests in the Air Ministry competition lead me to believe that success in this test was far more a matter of control than of wing section or within limits loading.

For commercial work control at low speeds will become of great importance. I have been told that certain of the earlier machines built at Farnborough could out-manœuvre a scout if kept to a low speed and were very heavy and slow on control when flown fast. Major Hills' experience on this point would be of great interest.

Apologising for the length of this communication,

Believe me, Sir,
Yours faithfully,
B. THOMSON.

Combe Close,
Woldingham, Surrey.
10th November, 1920.

To the Editor of the AERONAUTICAL JOURNAL.

DEAR SIR,—The AERONAUTICAL JOURNAL for November, 1920, contains some "remarks concerning some fundamentals of the theory of blade screws" by Dr. George de Bothezat, in which the following statement occurs:—"In the so-called Cascade Theory of Mr. R. M. Wood, the existence of an inflow produced by the blade considered is denied, and only inflow produced by the other blades is admitted." May I plead "Not guilty," and in support, quote my actual words from Advisory Committee Report R. & M. 639:—"The disturbance of flow at an airscrew blade element consists of one part due to the local action of the element and to another part due to the remoter action of the whole airscrew. Only this latter part necessitates a correction being applied to the aerofoil coefficients assumed for the element; the local disturbance was equally present in the aerofoil tests from which the coefficients for the elements are derived."

I do not question Dr. de Bothezat's analysis of the flow and the values obtained for the inflow velocities, but I state that in using the ordinary aerofoil tests which have been made in wind channels in the analysis of the forces acting on an airscrew, this inflow must be regarded as composed of two parts only, one of which is to be taken into account, this part representing the interference due to the other blades and to the blade itself at angular distances of $\pm 2n\pi$ where n has every integral value *except* 0.

Dr. de Bothezat may conceivably obtain his aerofoil data in some other way than that I have discussed, in which case my criticism of his work requires reconsideration.

In conclusion, I believe in the approximate truth of the relation $a = \frac{1}{2}b$ for

the total inflow; but I believe most airscrew designers will agree with me that in general this is found to over-estimate the mutual interference of the blades.

Yours faithfully,

R. McKINNON WOOD.

Royal Aircraft Establishment,
South Farnborough.
12th November, 1920.

To the Editor of the AERONAUTICAL JOURNAL.

The recent publication of R. and M. 639 (R. McK. Wood, Bradfield and Barber, September, 1919) on the application of multiplane interference to airscrew design, suggests some remarks on recent contributions to your Journal by Dr. Watts, Mr. Riach and Dr. Bothezat.

Taking first Dr. Watts' superposition of Drzewiecki's pulsating inwash disturbance repeated in two, three, four-phase distribution round the cycle, Mr. Riach put a query not yet answered.

The present writer ventured to apply the method for the two-phase distribution only, in which case one or both components are small round the whole cycle compared with the maximum value, so that the error arising from taking the arithmetic sum as the actual physical resultant is probably in small excess.

In Dr. Watts' extension to multiblade screws the error will probably be in serious excess, the superficial analogy with superposition of torques in a multi-cylinder engine being clearly unsound.

Turning to Dr. Bothezat's suggestion that the existence of inflow is denied altogether, he has surely not taken pains to consider the very simple physical view that inwash (in the absence of conserved energy in closed circuits round the air-screw) is very closely analogous to downwash in a continuous series of aerofoils in tandem.

This view receives strong encouragement from the report cited.

There will always remain, of course, small discrepancies in the analogy, and consequently in the test results, and these will only yield to suitable special methods.

With Dr. Bothezat's complaint of inadequate references, the writer has much sympathy.

The trouble arises in the aeronautical literature of all countries, partly from the youth of the science with its faults of inexperience and self-sufficiency, to be cured by time alone, partly from the struggle for place and award, inseparable from organised and industrial research, to be moderated only by abolishing ambition from human nature.

Later, a more detached survey by pure scientists may be a fairly effective check on mere intellectual dishonesty. Meanwhile, let us practise and welcome independent criticism.

In conclusion, one would like to see fuller recognition of Osborne Reynolds in Dr. Bothezat's own references.

A. R. Low.

London, November, 1920.