W. K. Bodger

The author is to be commended for presenting a carefully worked out, and experimentally confirmed, result. The results make possible a better feel for the details of the stresses in unshrouded compressor blades.

Some years ago the writer was confronted with the corresponding problem in turbine blades. While the aerodynamic sensitivity to blade incidence in turbine blades is less than in the case of compressor blades, the untwist angles are an order of magnitude larger. This is due largely to the plastic flow (creep), which in turn is due to the higher operating temperature.

The results of my study of this problem were not published in any detailed form. The essence, however, was included, along with the design solution of the problem in U. S. Patent 2,510,735 issued June 6, 1950. As shown in this patent, a unique shroud design was adopted to eliminate the problem. The validity of the solution has been attested by the successful operation of many thousands of turbojet engines, in both military and civilian service, during the past quarter century.

Author's Closure

As the contributor has pointed out, shroud design is effective against untwist. Not only turbine blades, but also almost all of the large fan blades have part-span shrouds to get better vibration characteristics and these shrouds stand against untwist deformation by constraining themselves each other.

It is remarkable that Professor Bodger had investigated the combined problem of untwist and creep about thirty years ago. His contribution to turbine design should be highly appreciated.