This paper presents a very useful development of a concept to diagnose causes of small discrepancies in turbine engine performance. The method whereby the math model of the engine is utilized to develop partial derivatives provides a good deal of flexibility to accommodate subsequent small engineering changes to the engine being evaluated. It has the further advantage of not requiring the implantation of known faulty components to generate reliable fault coefficients as does the approach developed by Louis Urban (Hamilton-Standard).

One small note of caution should be sounded regarding potential side effects. Because of its flexibility, the temptation is present to extend its use through many engineering changes without re-baselining the engine. This extension should be avoided because the cumulative effect of many small changes may very well not be negligible on derivatives. Further, because of the complex nature of the technical specifications the program cannot be used in a totally automatic mode but must use qualified engineering personnel to evaluate the combined effects of the diagnostic program identified modifications on all pertinent specifications.

Overall, the paper presents an extremely interesting concept which is well-tailored to its application for newly overhauled engines. Such engines require a very sensitive diagnostic tool because performance deviations causing noncompliance with specifications are usually slight.

Author's Closure

Mr. Smith's kind words are appreciated. His caution about over-extending the application of the program is well-taken. Current USAF/ALC plans call for a systematic re-baselining of OCALC managed engines over a period of several years. The diagnostic program will also be systematically updated at these times. Recent experience has demonstrated the validity of Mr. Smith's second caution concerning use of engineers in conjunction with the program. During the spring of this year the program was used as a tool, as intended, by engineering personnel to solve a small but quite complex problem with the J75-P-17.