DISCUSSION

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The authors show a very interesting measurement about the pressure fluctuations across the blade channel on the casing wall. They attribute the appearance of the second peak of the pressure fluctuation within the blade channel as the second harmonic for the inception of the rotating shell. The respective pressure traces are given in Fig. 18. The second peak is shown in blade channel *k*. The discusser would interpret the phenomenon in channel *k* as a sharp negative pressure pulse, the development of which can be followed from the previous channels *a–j*. This sharp negative pulse represents a sharp vortex sink caused by the vortex-filament-natured reverse flow, as described by Chen et al. (1989, 1992). Such a very sharp negative velocity pulse from special blade channel was also found by Day (1992) in the frontal region of the rotors as the initiating factor for the inception of the rotating stall.

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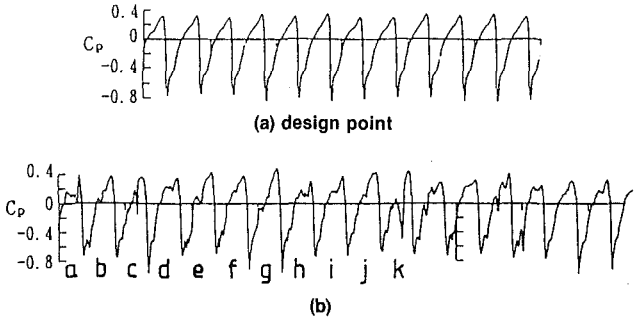

Fig. 18 Time traces of pressure measured on the casing wall at design point (*a*) and just before stall inception (*b*)

References

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Authors' Closure

The authors thank Dr. Chen for his comment. After reading his comment, they re-examined all the time traces of the casing wall pressure that they have. The sharp negative pulse appears at random within the rotor blade passage ($IZ \geq 12$ in Fig. 2) as well as upstream of the rotor leading edge ($IZ = 10$). It appears more frequently at the intrarotor than upstream of it. The pulses appearing upstream have to show the existence of reverse flow. But as this phenomenon occurs irregularly and instantaneously, it seems to be improper to explain it by a steady flow consideration. Furthermore, any propagation of the pulse from one blade passage to another has not been observed so far. At the present, therefore, the authors believe this is due to stall vortex caused by intermittent separation at the blade leading edge. Most of the stall vortices flow downstream, but they are occasionally disgorged forward of the rotor leading edge.