

**PRELIMINARY IDENTIFICATION OF BUFFET PROBLEMS
IN HIGH SPEED CIVIL TRANSPORT***

by

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In the present study, some effort is made to identify whether empennage buffet is a relevant factor in the design and operation of the High Speed Civil Transport (HSCT). Based on some results of the only operational supersonic transport, Concorde and the innumerable studies that exist on the tail buffet of high performance airplanes, CFD analyses on the HSCT as well as low speed wind tunnel tests on models, it appears as though buffet will be a factor that needs attention in the proper design of empennage structure. Utilizing the existing empirical relation between the reduced frequency of the leading edge vortices and the geometric parameters, it is estimated that the characteristic frequencies of the vortices from the wing cranks are in the range of certain fundamental frequencies of the wing-fuselage-empennage structure. Buffet is believed to be critical during take-off, climb, descent and landing. Computational and experimental data available in open literature indicates coherent vortex flow structure in the empennage region at supersonic cruise speeds. This raises further concern on the fatigue life of the empennage structure. Three second generation supersonic transport designs taken from open literature are briefly compared with the "empennage buffet" in mind. Future research efforts relating to buffet studies on the HSCT are summarized. A bibliography pertaining to the present research, including relevant studies on the first generation supersonic transport is presented. The effect of rounded wing leading edges on the present frequency estimates needs further study. The effect of engine exhaust on the flow field in the empennage region also needs further study.

* A report that describes this research is available from the author.