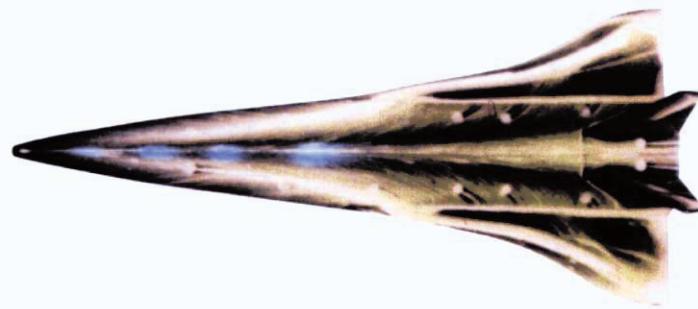


## 6. Oil Flow Pattern Visualization on a Space Plane of Supersonic Speed by Wind Tunnel Experiment and Computational Fluid Dynamics

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EXPERIMENT



COMPUTATION

OIL FLOW PATTERNS

$M=1.5$   $\alpha=15^\circ$

The results of a wind-tunnel experiment and a computational simulation are compared. The flow speed about a Space Plane is Mach 1.5 while the angle of attack is 15 degrees. The Reynolds number is 4 million regarding the half-span of the wing as a normalizing length. This Space Plane Model has been under research at the National Aerospace Laboratory (NAL) in Japan.

The upper picture shows the result experimented and visualized at the NAL using its supersonic wind tunnel.\* The lower one presents the computational visualization of the numerical results simulated using the high performance computer system called Numerical Wind Tunnel (NWT) at the NAL.\*\*

\* S. Sakakibara, T. Hara, J. Noda, H. Sekine, K. Ishida, S. Nomura and T. Uchida, Pressure distribution measurement at NAL's supersonic wind tunnel about a Space Plane, Proceedings of the 26th Aircraft Symposium, 1988, pp. 648-651. (in Japanese)

\*\* K. Matsushima and T. Iwamiya, Practical Application of CFD to High Angle of Attack Aerodynamics, Journal of Japan Society of Aeronautical and Space Sciences, 48-561, 2000, pp. 554-559. (in Japanese)