

SWIRL NUMBER SELECTION FOR REDUCTION OF VARIOUS FORMS OF JET NOISE

IITM Technology Available for Licensing

Problem Statement

- The problem statement discussed in the present invention is **how to suppress/reduces the significant noise in the jet engines in effective manner.**
- Hence, subject invention addresses the issue in efficient manner.

Technology Category/ Market

Technology: Jet noise suppressor in a jet engine;
Industry/Application: Automotive Industry; Aerospace, Aircraft Engine; Jet engine,
Market: The global **jet engines** market is projected to reach at a **CAGR of 7.8%** during the forecast period **(2024-32)**.

Technology

- Present patent describes a **device and method for reducing jet noise** using **co-axial flat/helix curve vane swirler** for various swirl numbers.
- The method comprising the steps of:

1. providing for a nozzle;
2. providing for a downstream end to discharge engine flow;
3. providing for a co-axial vane swirler of a suitable swirl number before the downstream end.

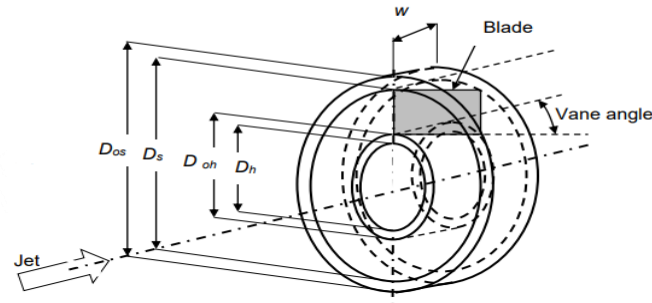


Fig.1 depicts schematically one of the embodiments of the co-axial swirler with nomenclature; Only one flat vane is shown here.

- A **jet noise suppressor in a jet engine** having a jet center longitudinal axis, comprising of :
 - a **nozzle**, a **downstream end to discharge engine flow** and a **co-axial vane swirler** of a suitable swirl number before the downstream end, wherein the swirl number (S) may be determined by the equation.
- The number of vanes may be **six** and or **less than or more than six**.

TRL (Technology Readiness Level)

TRL-4, Technology validated in Laboratory

Intellectual Property

IITM IDF Ref. 1350;
IN Patent No. 454509 (Granted)

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Images

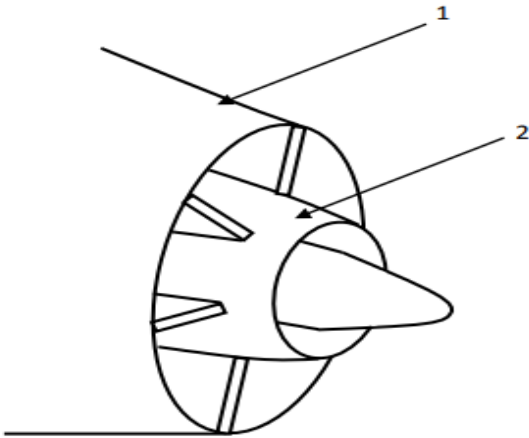


Fig.2 depicts the exit of the gas turbine engine with co-axial swirler device installed;

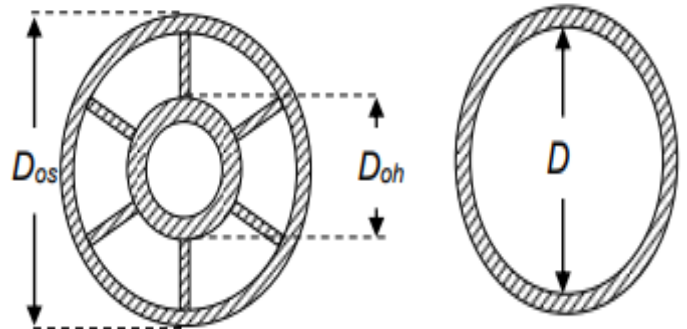


Fig.3A shows the front view of the co-axial swirl device; **Fig. 3B** shows the free jet or nozzle device;

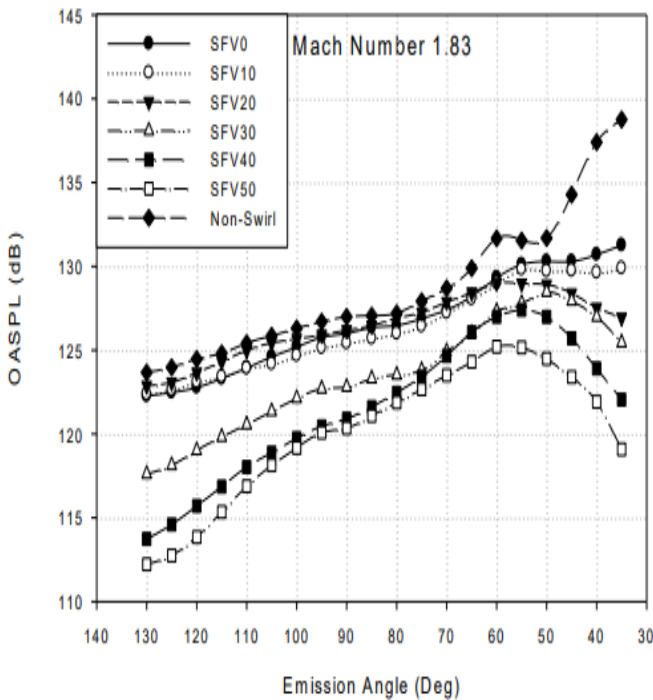


Fig.4 shows Overall Sound Pressure Level (OASPL) comparisons between the free or non-swirl jet with co-axial swirl jets for Mach number = 1.83

Key Features / Value Proposition

- ❑ **The co-axial swirl device enhances** the mixing between the jet fluid and surrounding ambient fluid and **reduce or enhance** the noise levels depending on the vane angles / swirl numbers.
- ❑ **Enhancement** of the mixing and spread rates from the **co-axial swirl device** causes **to mitigates the shock** associated noise levels and **complete elimination of screech ton.**
- ❑ The main jet noise sources turbulent mixing noise, shock associated noise, screech tones, mach wave radiations are **mitigated** by the claimed device.

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