

A ROTATING SPINDLE TYPE FLUID ATOMIZER FOR SPRAY ATOMIZATION

IITM Technology Available for Licensing

Problem Statement

- Existing atomizers struggle to produce fine droplets at low injection pressures, impacting combustion efficiency and emission levels in applications like gas turbines, spray painting, and agriculture.
- Current atomizers lack the ability to precisely control droplet sizes and flow, particularly crucial in applications like agriculture and spray painting. The invention addresses these issues by enabling fine droplet production at low pressures while providing control over the droplet size range.

Technology Category/ Market

Category – Fluid Atomization Technology

Applications – Gas turbine combustors, Oil-fired furnaces, Spray painting processes, Agriculture (fertilizer spray), Fire protection systems, Medicinal sprays.

Industry – Aerospace (Gas turbine combustors) Energy, Automotive and Manufacturing, Agriculture, Fire Safety and Protection, Fire Safety and Protection, Pharmaceutical and Healthcare (Medicinal sprays)

Market - The global fluid power equipment market grew from \$28.29 billion in 2022 to \$30.81 billion in 2023 at a (CAGR) of 8.9%.

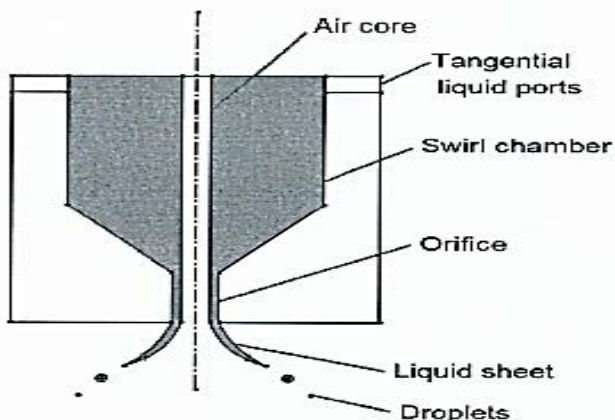


Fig. 1 Schematic view of conventional Simplex atomizer

Technology

• Rotating Spindle Mechanism:

- Utilizes a rotating spindle, powered by an external source, to eliminate air core formation and create a thin swirling liquid film.

• Tangential Velocity Impartation:

- The rotating spindle imparts a tangential velocity to the fluid, facilitating the generation of a swirling flow for thinner liquid sheets and finer droplets.

• Vane-Induced Turbulence:

- Mounted vanes induce turbulence in the flow, aiding in the early breakup of droplets and enhancing atomization.

• Serrated Divergence at Exit Pipe:

- Features serrated divergence at the exit pipe, introducing controlled disturbances for early liquid sheet breakup and smaller droplet formation.

• Combined Swirl and Rotary Atomization:

- Integrates elements of both swirl and rotary atomizers, offering a compact design, fine atomization at lower pressures, and improved control over droplet size and dispersion.



Fig. 6 Actual prototype

CONTACT US

Dr. Dara Ajay, Head
Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

IITM TTO Website:
<https://ipm.icsr.in/ipm/>

Email: smipm-icsr@icsrpis.iitm.ac.in

sm-marketing@imail.iitm.ac.in

Phone: +91-44-2257 9756/ 9719

Image

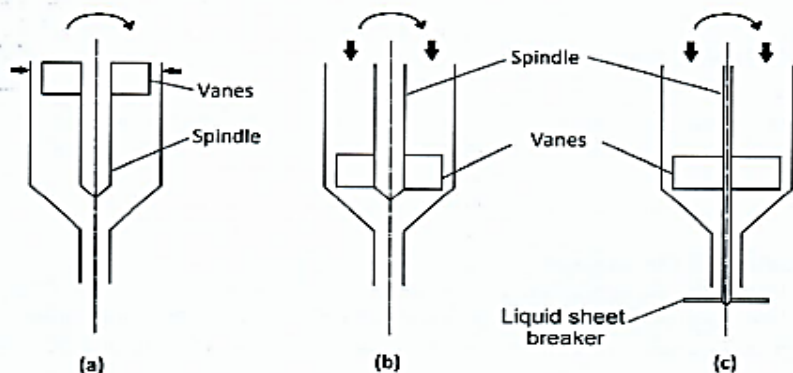


Fig. 2 Schematic view of rotary spindle pressure swirl atomizers

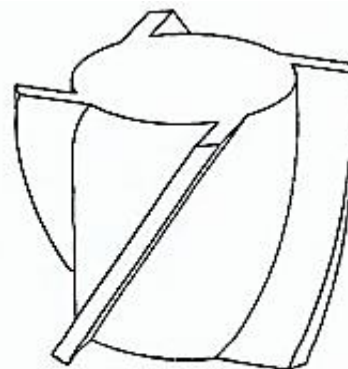


Fig. 3 Vanes on rotary spindle

Key Features / Value Proposition

User Perspective:

- **Efficiency Gains:** Users benefit from improved combustion efficiency and emissions reduction due to the invention's fine droplet production at lower injection pressures.
- **Versatile Use:** Users value the invention's adaptability, offering controlled atomization for diverse applications in agriculture, spray painting, and pharmaceuticals.

Technical Perspective:

- **Innovative Atomization:** The rotating spindle, tangential velocity, and vane-induced turbulence provide an innovative solution for efficient fluid atomization.
- **Integrated Technologies:** The invention combines swirl and rotary atomization in a compact design, addressing technical challenges and enhancing drop size distribution at lower pressures.

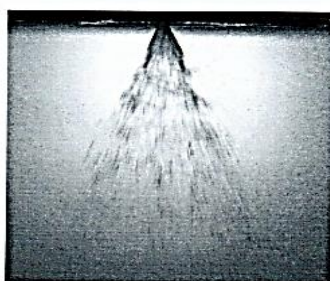
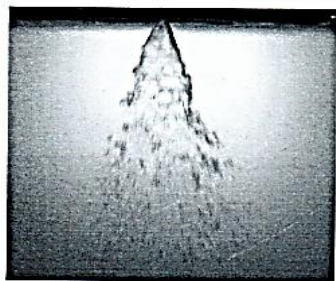


Fig. 7 Actual spray images

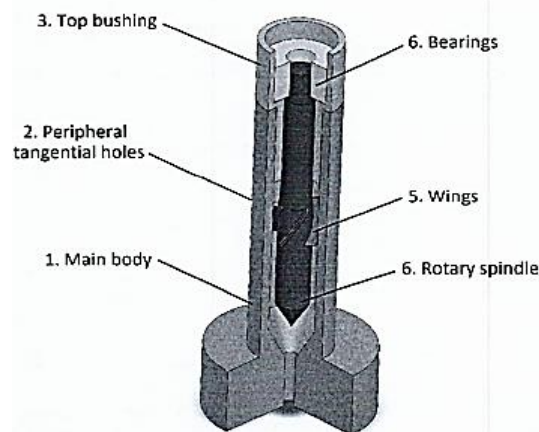


Fig. 5 Prototype

Intellectual Property

- IITM IDF Ref. 1665
- IN 396309 (PATENT GRANTED)

TRL (Technology Readiness Level)

TRL- 4, Technology validated in lab

Research Lab

Prof. Sundararajan T
Dept. of Mechanical Engineering

CONTACT US

Dr. Dara Ajay, Head
Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

IITM TTO Website:
<https://ipm.icsr.in/ipm/>

Email: smipm-icsr@icsrpis.iitm.ac.in

sm-marketing@imail.iitm.ac.in

Phone: +91-44-2257 9756/ 9719