

# Numerical Investigations of Air Flow Around a Model Freight Truck with A Rear Active Flow Control

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Road vehicles such as trucks and tractortrailers are major means of transporting goods across the globe, and their aerodynamic drag is a major contributor to their fuel consumption. These vehicles are also major sources of pollutants. Reducing their aerodynamic drag results in reduction in their fuel consumption as well as the amount of pollutants introduced into the atmosphere. Here we have introduced an active control method by using rear vertical rotating cylinders for reducing the drag of trucks and tractor-trailers, which should results in reduced their fuel consumption and emission.

## **Study Methods**

Numerical and experimental investigations of air flow over a modified Ahmed body with two vertical rear cylinders were performed. The cylinders spanned the height of rear back, spaced at 1/8D and protruding the same amount into the free stream. The cylinders were rotating in opposite direction, injecting momentum into back of the modified Ahmed body. The investigations were performed when the momentum injected into the back of the modified Ahmed body was less than, equal to and higher than free stream momentum.

> Active flow control with rear rotating cylinders reduces drag of trucks, thus less fuel consumption and emission.

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## Figure caption



Figure caption

## **Findings**

When the momentum injected into the back of the Ahmed body by the rotating cylinders is less than the free stream momentum, up to 8% reduction in overall drag of the vehicle was obtained.

## **Policy Recommendations**

A system of rotating cylinders that could be adapted for the trucks and tractor-trailers that will reduce their fuel consumptions and emissions.

## About the Authors

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#### **To Learn More**

For more details about the study, download the full report at transweb.sjsu.edu/research/1865.



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