

## ABSTRACT

The global energy issue requires engineers and expert scientist to generate energy efficient and environment friendly vehicles. Semar UGM is an automotive team from Universitas Gadjah Mada which was established to produce futuristic and energy efficient vehicles. Semar UGM is purposed to be a world-class champion in the Shell Eco Marathon competition which is held each year, whereas this competition consists students from all around the world to compete and win in several categories e.g. design, manufacture, and race the most energy-efficient vehicle. In order to bring the optimal efficiency condition, a well-designed vehicle is demanded. One of step is from the body design in aerodynamic aspects. The well-designed vehicle body must comprehend the suitable coefficient of drag and drag force as small as possible, therefore the inhibiting force can be minimized.

This research is aimed to invoke a qualified geometry to be functioned in Semar vehicles and agreed as the race regulation has appertained. The geometry varies on the tire body with the variations of covered wheel and uncovered wheel in simulation whereas consist average speed of 10 m/s and maximum speed of 15 m/s (as the race regulation confirmed). The simulation conducted in numerical analysis using ANSYS Fluent 18.2 software.

Regarding this knowledge, it will contain proof which a geometrical covered wheel is closed by body part produces the coefficient drag and drag force a smaller value when it is compared to the geometrical uncovered wheel in which the tire is cleared from body part. This study will also discuss body pressure contour and velocity contour on the various planes as they are analyzed.

**Keywords:** Shell Eco-Marathon, Numerical Study, ANSYS Fluent, Aerodynamics, Energy-efficient vehicle, Coefficient of Lift, Coefficient of Drag.