

**NUMERICAL STUDY OF THE EFFECT OF THE SPEED OF THE
INDONESIA–CHINA HIGH-SPEED RAILWAY (KCIC) ‘WHOOSH’ ON
BUILDING WALLS LOCATED ON ONE SIDE OF THE RAILWAY TRACK
AT AN S/H DISTANCE RATIO OF 0.7**

Audha Fitrah Aulina, S.T., M.T. *Supervisor*

Naufal Fuad Hasan
*Automotive Engineering Study Program
Engineering Department*

ABSTRACT

This study aims to analyze the effect of speed variation of the Indonesia–China High-Speed Railway (KCIC) “Whoosh” on aerodynamic characteristics around the train due to the presence of a building wall on one side of the railway track at an S/H ratio of 0.7. The research problem focuses on the effect of speed variation on the drag coefficient (C_d), pressure coefficient (C_p), and airflow patterns around the train. The study employed a numerical simulation method based on Computational Fluid Dynamics (CFD) using the SST $k-\omega$ turbulence model at velocity variations of 70 m/s, 83 m/s, and 97 m/s under wall and no-wall conditions. The Grid Independence Test indicated an optimal mesh number of 161,362 elements with a stable drag coefficient value of 0.175. Model validation produced an error of 0.059%, indicating that the simulation was valid. The results showed that the presence of a wall affected the train’s aerodynamic characteristics. The drag coefficient values under wall conditions were lower than those without a wall, namely 0.175, 0.171, and 0.168, while the values without a wall were 0.330, 0.329, and 0.328 at speeds of 70 m/s, 83 m/s, and 97 m/s, respectively. The pressure coefficient distribution indicated airflow acceleration in the gap between the train and the wall due to the nozzle effect, affecting pressure patterns and airflow characteristics around the train.

Keywords : *Aerodynamics, CFD Simulation, Drag Coefficient, Pressure Coefficient, Whoosh High-Speed Train*