

Background

The problem of diesel engine

- Thermal efficiency
- High torque
- Weight saving
- Noise
- Vibration
- Exhaust emission

Conflicting issues

Comfortable sound that is not low noise

The purpose of this research

Preceding study: focus on DM 1st ord

Focus on **engine speed** and **the variation** of combustion sound

Make combustion noise that feels comfortable

Content

Relationship between comfort and fluctuation by engine speed and variation

Examination of **metrics** due to the subjective evaluation

Subjective evaluation:

- SD method
- Paired comparison method

Comfortable Fluctuation

Construction of estimation mode for comfortable at each engine speed

Calculation of estimation model for comfortable at each engine speed by **multiple regression analysis**

Objective variable: Comfortable Score

Explanatory variable:

- Sound pressure fluctuation
- Psychoacoustic evaluation

$$y = \alpha x_1 + \beta x_2 + \gamma x_3 + \dots + \lambda x_n + C$$

Make comfortable sound by structural change using FEM model

Make comfortable sound by **structural change** using numerical simulation

Focused on FRF and diesel engine structure

Make the sound of **small fluctuation**