A Proposal for a Simulated Running Environment for Railway Vehicle Control Engineering Tests Using a Scaled Roller Rig that Simulates High-Speed Friction Fluctuations

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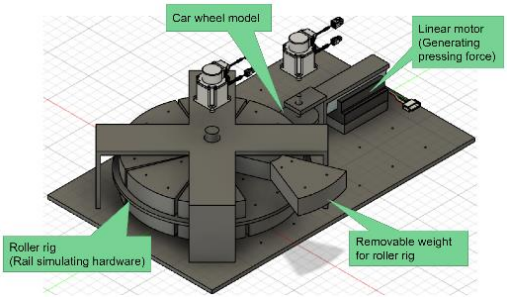
Demand for automatic train operation

- Low birth rate is social issue in Japan and the Netherlands (The World Bank 2023)
- Low birth rate causes decline of railroad worker number
- Existence of platform door limits acceptable stopping position

→Precise automatic control technology for railroad vehicle is required

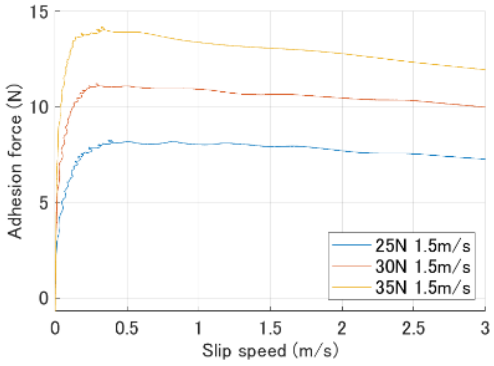
Proposal for roller rig system simulating high-speed friction fluctuations (Ueno January 2023)

- Roller rig system simulates adhesion between wheel and rail
  - Full scale (Yamanaga 2018) and scaled system (Matsudaira 1953) are used in previous research
- Features of proposed system
  - 1/10 scale
  - Pressing wheel and roller rig using linear motor thrust
  - Simulate the variation of maximum adhesion force between the wheel and the roller rig quickly by controlling linear motor thrust



Roller Rig System Adhesion Characteristics Measurement (Ueno May 2023)

- Adhesion force is measured by disturbance observer using car wheel rotation angle information
- Three adhesion characteristics of actual train below is simulated by scaled roller rig system
  - Adhesion force increases with slip speed in low slip speed area
  - Adhesion force takes maximum value at certain slip speed (static friction force)
  - Adhesion force decreases under high slip speed condition (sliding friction force)



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