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Change of force between shafts and winding pitch radius of chain type continuously variable transmission at steady state

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The objective of this study is to clarify the mechanism for changing axial force and winding pitch radius of a chain type CVT at steady state. Pulley thrust, input rotational speed, and speed ratio were kept constant during experiment, while input torque was steadily increased from 0 Nm up to the state of sliding slip. The axial force was measured by a load cell. In addition, strain on the surface of rocker pin was measured by strain gauges. Nonlinear decrease of pitch radius of the chain belt was observed at the entrance of driving pulley while nonlinear increase of that was oppositely observed at the exit. The estimated results of radial displacement of the chain belt calculated with geometrical relationship were agreed with the experimental data, when the tilt of movable sheave was considered. It was shown that radial displacement of the chain belt was dominated by the change of observed wedge angle of driving pulley due to the tilt of movable sheave. In addition, large transmittable torque was measured when a rigid pulley was applied to driving pulley, compared with that when a movable pulley was used. It was suggested that contact arc in driving pulley was decreased due to the change of pitch radius of chain belt. It was found that the axial forces were changed with the change of winding pitch radius of chain belt because total of reaction forces in contraction direction was changed by the change of practical contact arc between chain belt and pulley.

Biography

Shun Hattori is currently a graduate student of Doshisha University, Kyoto, Japan majoring in Mechanical Engineering. He is studying on power transmission mechanism of chain belt type continously variable transmissions. He aims to develop a new mechanical power transmission after completion of his master course.

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