

Perancangan dan Analisa Stabilitas Sepeda Tiga Roda = Design and Stability Analysis of Three-Cycle

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Abstrak

Sepeda tiga roda merupakan perkembangan dari sepeda roda dua dengan kestabilan dan kenyamanan yang lebih baik. Sepeda tiga roda memiliki dua konfigurasi, yaitu dua roda di depan dan dua roda di belakang. Skripsi ini membahas tentang perancangan sepeda tiga roda khususnya rangka dua roda di bagian depan. Rangka tersebut dirancang menggunakan perangkat lunak Autodesk Inventor Professional 2023 Student Version. Sepeda tiga roda disimulasikan dengan perangkat lunak yang sama melakukan gerakan kritis di tikungan pada kondisi stabil di berbagai kondisi kecepatan dan radius putar. Dari hasil simulasi ditemukan dua fenomena tergelincirnya sepeda tersebut. Kedua fenomena tersebut diawali dari roda belakang tergelincir. Kemudian terjadi perubahan arah stabilitas ke arah luar mengakibatkan sepeda terbalik atau ke arah dalam mengakibatkan dua roda depan tergelincir. Fenomena pada roda belakang dianalisis dengan tujuan untuk mengontrol roda belakang. Analisis dilakukan secara eksak dengan menyajikan teori stabilitas untuk sepeda tiga roda di tikungan berdasarkan teori stabilitas pada kendaraan roda dua. Dari hasil perhitungan menunjukkan gaya gangguan pada roda belakang lebih besar dibandingkan dengan gaya lateral resistensi. Sepeda tiga roda terjatuh akibat dari slip pada roda belakang.

.....A three-wheeled bicycle is a development of a two-wheeled bicycle with better stability and comfort. A three-wheeled bicycle has two configurations, two wheels at the front and two wheels at the rear. This thesis discusses the design of a three-wheeled bicycle, especially the two-wheel frame at the front. The frame is designed using Autodesk Inventor Professional 2023 Student Version software. The three-wheeled bicycle is simulated with the same software performing critical movements in a corner at steady state under various conditions of speed and turning radius. From the simulation results, two slipping phenomena were found. Both phenomena started with the rear wheel slipping. Then there is a change in the direction of stability outward resulting in the bicycle overturning or inward resulting in two front wheels slipping. The phenomenon on the rear wheel is analyzed with the aim of controlling the rear wheel. The analysis is done in an exact way by presenting a stability theory for a three-wheeled bicycle in a corner based on the stability theory of two-wheeled vehicles. The calculation results show that the disturbance force on the rear wheel is greater than the lateral resistance force. The three-wheeled bicycle crashed due to the slip of the rear wheel.