Final Assignment

Stefano Migneco

December 2024

1 Forces

I added two forces to this simulation: the effect of friction on the wheel hub, and rolling resistance. According to hambini.com, wheel hubs lose between 2-5 Watts, so I put a power loss of 3W in my simulation. For rolling resistance, I found the formula to be the dimensionless coefficient of rolling resistance times the normal force. For the coefficient itself, bicyclerollingresistance.com tested the coefficient of rolling resistance for a variety of tires at a variety of speeds and found them to be around 0.0035 or higher, so I added a coefficient of rolling resistance of 0.0035.

2 Simulation

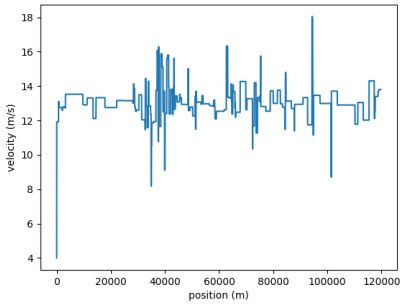

Figure 1: A 70 kg rider doing a 400-Watt ride of the Winnewana path. The average velocity was 13.10 m/s

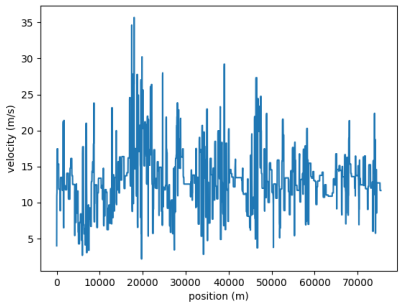

Figure 2: A 70 kg rider doing a 400-Watt ride of the Basque path. The average velocity was 13.19 m/s

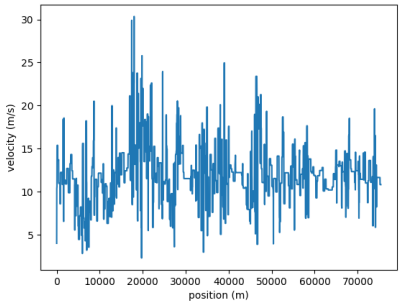

Figure 3: A 50 kg rider doing a 300-Watt ride of the Basque path. The average velocity was 11.95 m/s