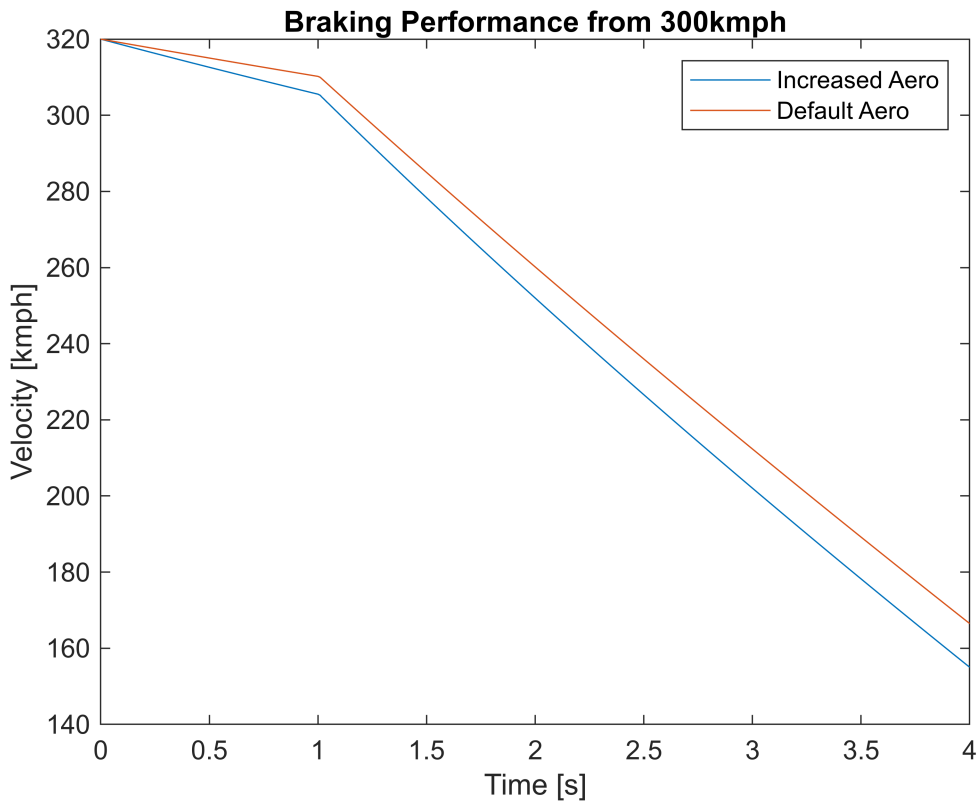# Braking Performance Comparisons

Comparing the braking performance for different aerodynamic setups (default and increased)

```
load("Braking_180_Default_Aero.mat")
load("Braking_300_Default_Aero.mat")

load("Braking_180_Increased_Aero.mat")
load("Braking_300_Increased_Aero.mat")
```

```
p1 = plot(Braking_300_Increased_Aero.v.time, Braking_300_Increased_Aero.v.data);
hold on
p2 = plot(Braking_300_Default_Aero.v.time, Braking_300_Default_Aero.v.data);
ylabel("Velocity [kmph]")
xlabel("Time [s]")
title("Braking Performance from 300kmph")
legend(["Increased Aero", "Default Aero"])
hold off
```
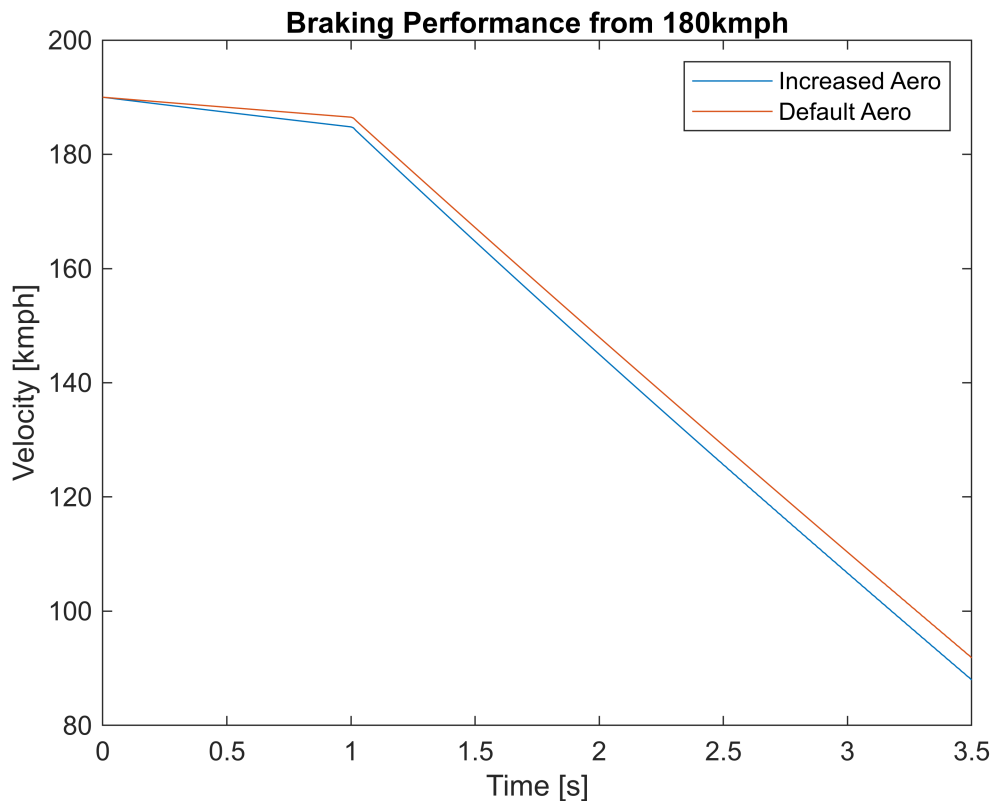

Comparing the braking performance of a vehicle with increased aerodynamics to one with less downforce, and therefore less drag, from 300km/h to 180km/h; we see the performance is greater for the vehicle with increased aerodynamics.

The increased aerodynamic configuration allowing this deceleration to take place over 2.36s compared to the 2.5s of the vehicle with less downforce and drag. The vehicle with 50% more downforce (and drag) was

therefore able to gain 0.14s under braking, which is significant when accumulated over the course of a single lap and full race distance.

```
p3 = plot(Braking_180_Increased_Aero.v.time, Braking_180_Increased_Aero.v.data);
hold on
p4 = plot(Braking_180_Default_Aero.v.time, Braking_180_Default_Aero.v.data);
ylabel("Velocity [kmph]")
xlabel("Time [s]")
title("Braking Performance from 180kmph")
legend(["Increased Aero", "Default Aero"])
hold off
```


Comparing the braking performance of a vehicle with increased aerodynamics to one with less downforce, and therefore less drag, from 180km/h to 100km/h; we see the performance is greater for the vehicle with increased aerodynamics.

The increased aerodynamic configuration allowing this deceleration to take place over 2.06s compared to the 2.11s of the vehicle with less downforce and drag. The vehicle with 50% more downforce (and drag) was therefore able to gain 0.05s under braking, which is less significant than the previous braking condition from 300km/h to 180km/h. This gain in performance is still significant over the course of a full race distance although less significant than the heavier braking scenario described above.