Assignment II

CE787A

Questions

1) Write a generic program for calibrating the response-stimulus model for the given follower and leader data given in the excel files. The equation of the response-stimulus model is as follows:

$$\ddot{x}_i(t+\tau_i) = \alpha \frac{[\dot{x}_i(t+\tau_i)]^m}{[x_{i-1}(t) - x_i(t)]^l}[\dot{x}_{i-1}(t) - \dot{x}_i(t)],$$

where x_i, $\dot{x}_i$, and $\ddot{x}_i$ are the displacement, speed, and acceleration of the subject vehicle i, and similar notation applies to its leader $i-1$. τ is the perception-reaction time that applies to all drivers, α is a dimensionless sensitivity coefficient, and m and l are speed and spacing exponents, respectively.

In the excel files, all the relevant data are given. Find the appropriate parameters using the trial-error method to fit with field data reasonably.