**Restating the question**

Where

Model transfer function is

**Continuing with the solution.** Plant dynamics can be written as

Where

Reference model dynamics are

Error dynamics can be written as

Error derivatives are computed below

For perfect tracking

Parameter errors are defined

Then the becomes

Let us define a Lyapunov function

Taking the derivative of it

Substituting the

In order to make negative semi definite, adaptation rules are selected as below

This yields

Since is unknown, we can make below definitions

Then the adaptation rules become

**Stability and convergence check.** Since , it can be said that are bounded.

Let us use the Barbalat’s Lemma

is known to be bounded.

Let us state the

We know that are bounded. is assumed to be bounded. is bounded since and are bounded. Thus, is bounded, and thus, is bounded. Moreover, as per Barbalat’s Lemma, since is bounded, is uniform continuous; and since is uniform continous it can be stated that