The state vector I used consists of the following parameters [x,y,ψ,v]:

1) x-position
2) y - position
3) vehicle's orientation angle
4) vehicle's velocity
5) cross error (cte) of the vehicle
6) epsi of the vehicle

And the actuators vector [δ , a]:

1) steering wheel angle
2) vehicle's acceleration

The update equations I used are the following:

1) x = x + v * cos(ψ) * dt
2) y = y + v * sin(ψ) * dt
3) v = v + a*dt
4) ψ = ψ + (v/L_f) * δ * dt

As it is obvious I used the kinematic model to predict the state of the vehicle in 100ms ahead of time. Use the predicted state for MPC controller and update the steering wheel and thorn values. (Latency of 100ms)

The prediction horizon T I used:

```
size_t N = 15;
double dt = 0.05;
```

I started with N=20 and dt =0.05 as the lessons but as i decrease the N parameter the model behaved better.