

Role of control engineer is to develop a model and then check stability and make it stable, and meet all the requirements. Different tools like RH criterion, Root Locus, Bode Plot, Nyquist Plot can be used to check the stability of the control system. All these tools are classical tools and all these tools are based on transfer function approach. The controller used in classical control theory are PID controller and lag lead controller. These tools were built in between 1920 to 1950.

Development of the digital computer enabled state space techniques in control system design after 1960. The state space technique is based on time domain approach. After 1980 all the classical and state space approaches combined to form new approach called as robust control approach.

In case of state space approach we have to know the internal parameters of the system along with input and output. But in case of transfer function approach we are just applying the input and getting the output.

Classical approaches are applicable to only linear, time invariant differential equations, whereas state space approach can be used to represent linear and non linear systems that have backlash, saturation, and dead zone. State space approach can handle the systems with non zero initial conditions. State space approach can handle the systems with non zero initial conditions.

State space methods work directly with the governing differential equations in the time domain.

State space approach is applicable to time varying systems.

State space equation is applicable to single input single output as well as multi input multi output systems.

State equation are always first order irrespective of the systems order, input and outputs.

The conventional indicators of the closed loop performance are the closed loop poles or the locations of the closed loop poles. For higher order systems, by varying limited number of constants in the controller transfer functions, one can vary the locations of only a few of closed loop poles not all of them.

In classical approach we can not place the poles as per the requirements. So by classical approach we can't achieve the performance that we desired. But in case of state space approach the poles can be placed anywhere and we get the desired behavior.