



SNS COLLEGE OF ENGINEERING

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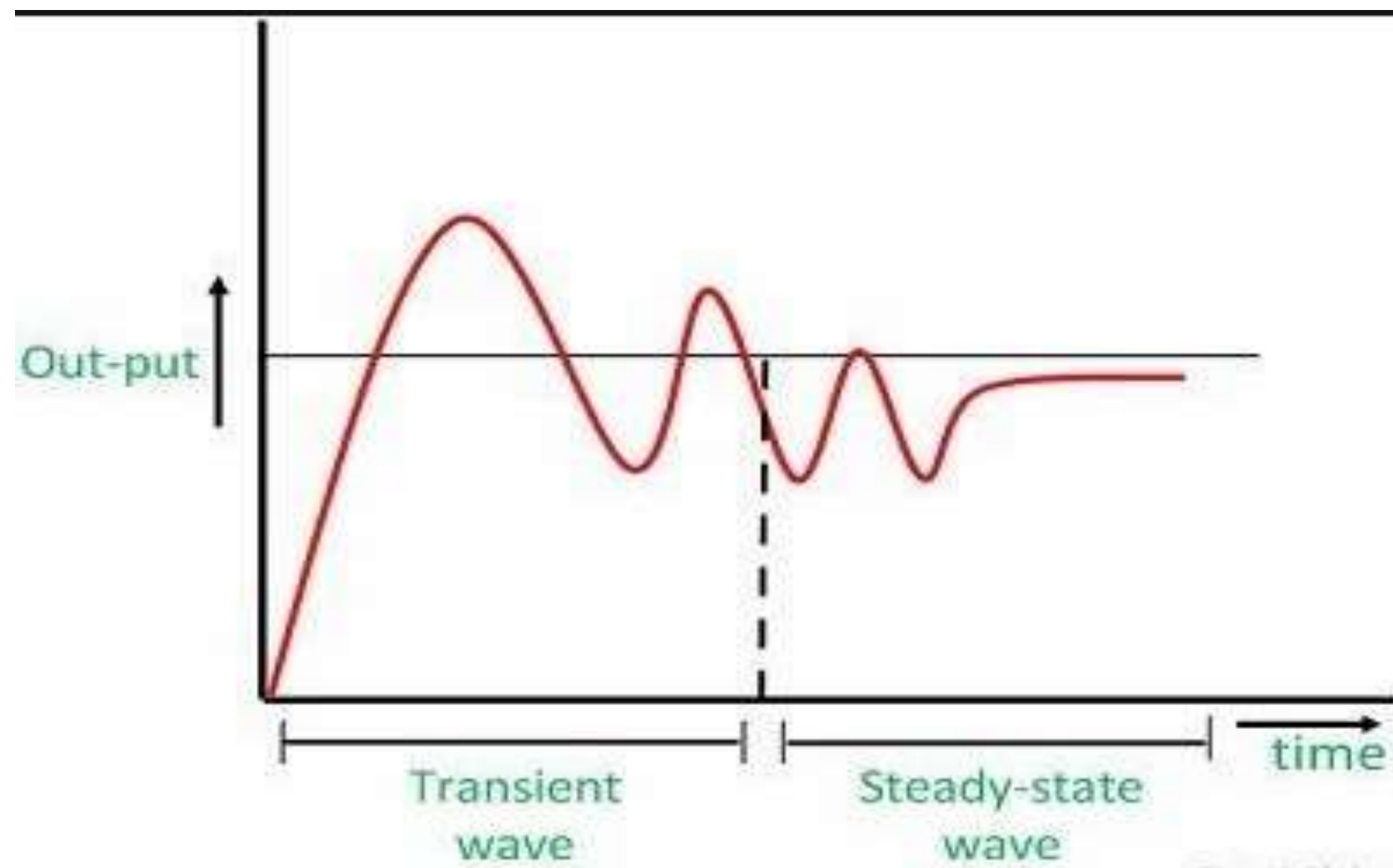
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT – V

Stability Studies and Reactive Power Compensation
Power System States







CONTENTS

- Introduction
- Classification of power system states
- Power System Stability



INTRODUCTION TO POWER SYSTEM STABILITY

- Modern power system is complex and linear interconnected network.
- It consists of interconnected transmission lines, generating plant transformers and variety of loads.
- With increase in demand nowadays some transmission lines are overloaded than their normal limits.
- With the increased loading of long transmission lines , the problem of transient stability has become a serious limiting factor.

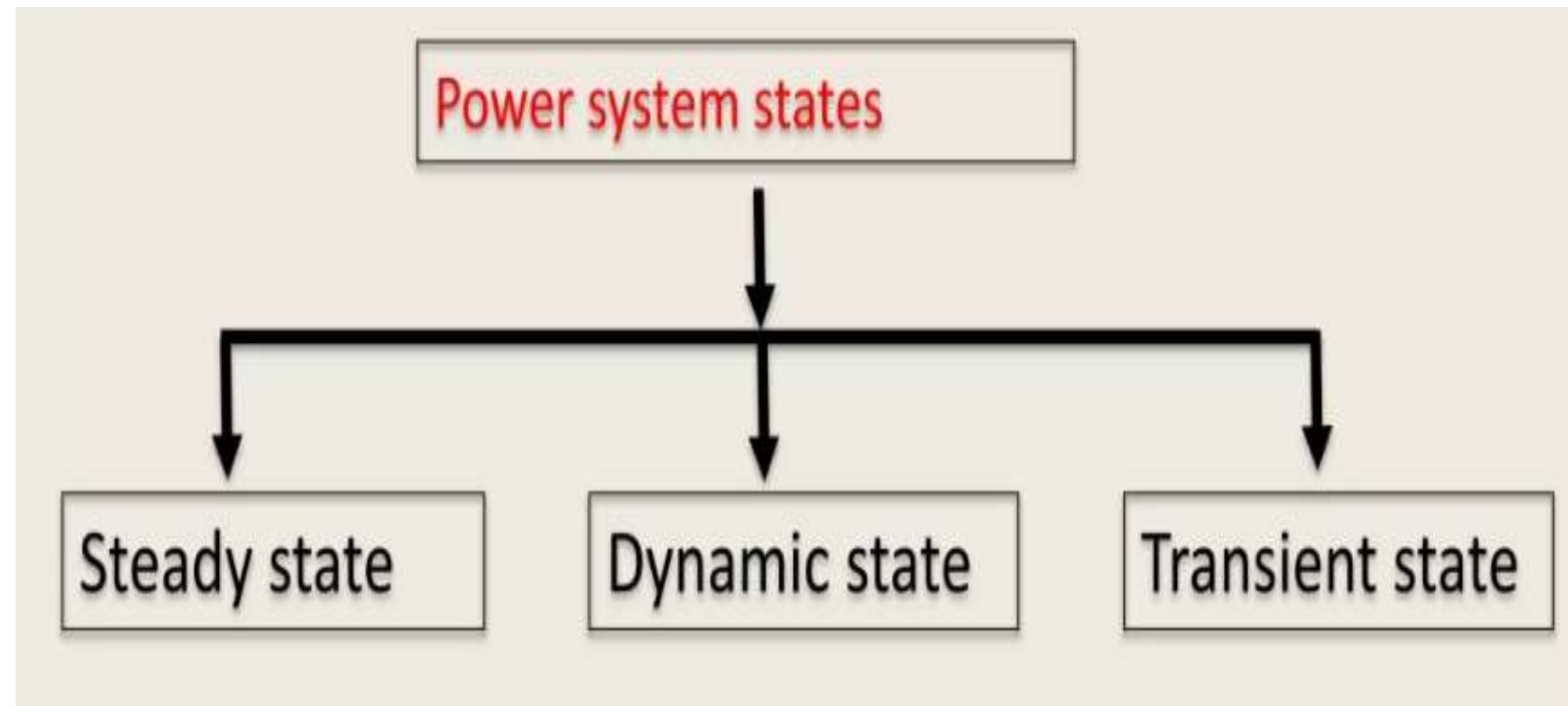


Classification of power system states

- The power systems are highly non linear system.
- Operates in constantly changing environment – loads, generator outputs, key operating parameters.
- When subjected to disturbance , the stability of the system depends on the initial operating condition as well as the nature of the disturbance.
- Stability of electric power system is thus a property of the system motion around an equilibrium.



Classification of power system states





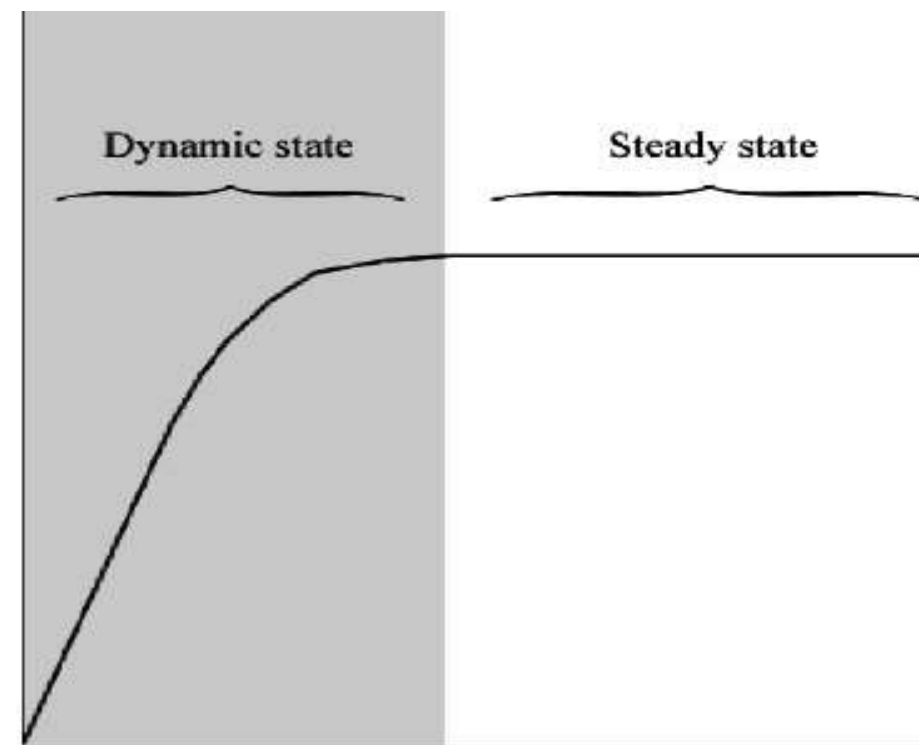
STEADY STATE

- In an interconnected power system, rotors of each synchronous machine in a system rotate at the same average electrical speed .
- The power delivered by the generator to the power system is equal to the mechanical power applied.
- During steady state operation , the electrical power balances the mechanical power in.



DYNAMIC STATE

- Dynamic stability is more probable than steady state stability.
- Small disturbances are continuously occurring in a power system (variations in loadings , changes in turbine speeds, etc.,) which are small enough not to cause the system to lose synchronism but to excite the system into the state of natural oscillations.
- In a dynamically unstable system , the oscillation amplitude is large and these persist for a long time.



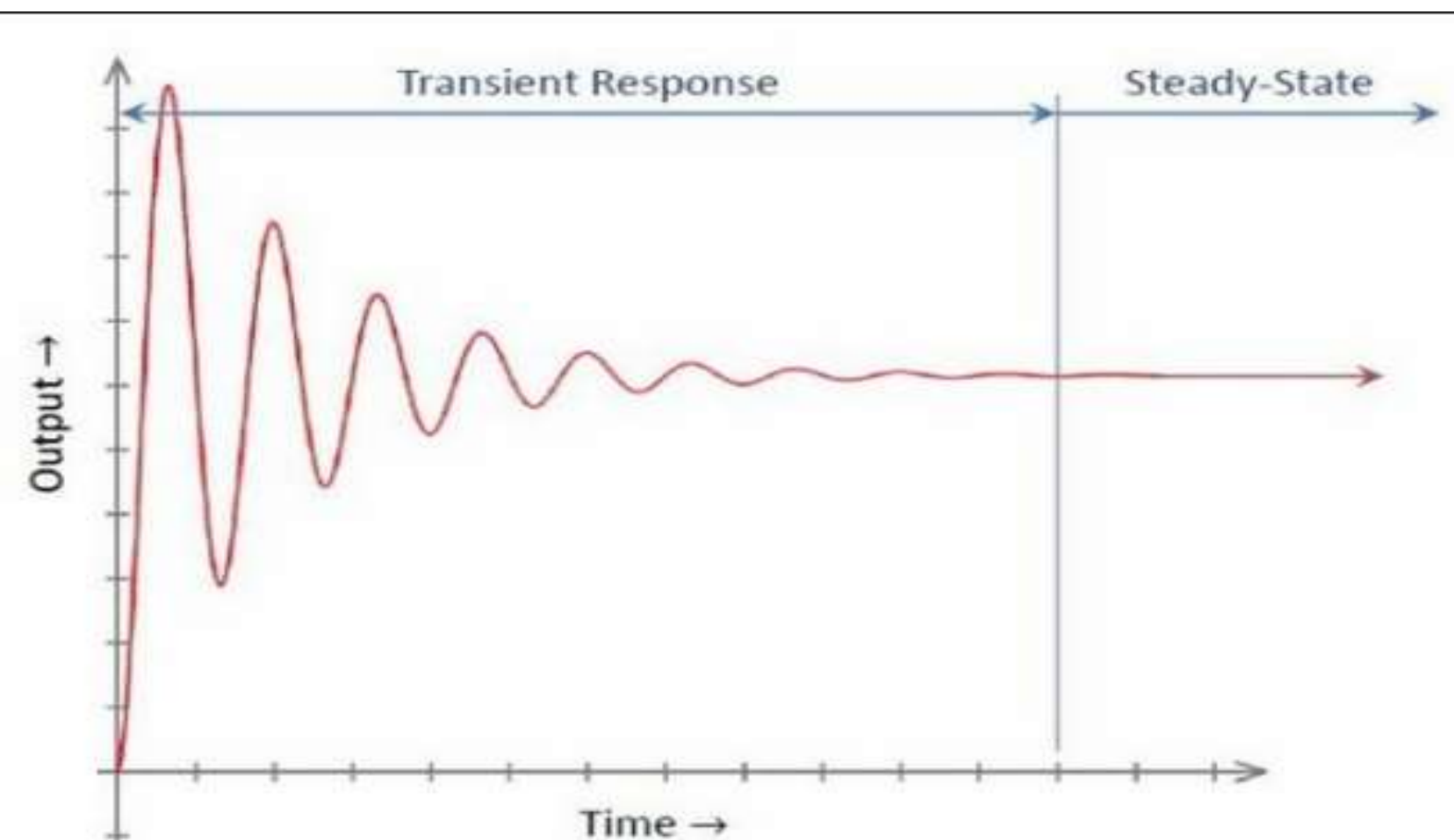


TRANSIENT STATE

- For a large disturbance , changes in angular differences may be so large as to cause the machines to fall out of step.
- This type of instability is known as transient stability.
- It is the fast phenomenon usually within 1 sec for a generator close to the cause of disturbance.



TRANSIENT STATE vs STEADY STATE





ASSESSMENT

1. Which of the following equipment is a permit to separate the generator feeders and circuit breakers from the bus bar for maintenance?
 1. Fuse
 2. Circuit breaker
 3. Lightning arrester
 4. **Isolator**



ASSESSMENT

1. Consider the methods given below.
 1. Use of additional parallel transmission line
 2. Upgrading voltage on the existing transmission system
 3. Use of bundled conductors
 4. Use of transformer with lower leakage reactance
- Which of the above methods can be used to improve the steady state stability limit of the system.
- 1,2,3
- 1,2,4
- 3,4
- **1,2,3,4**

