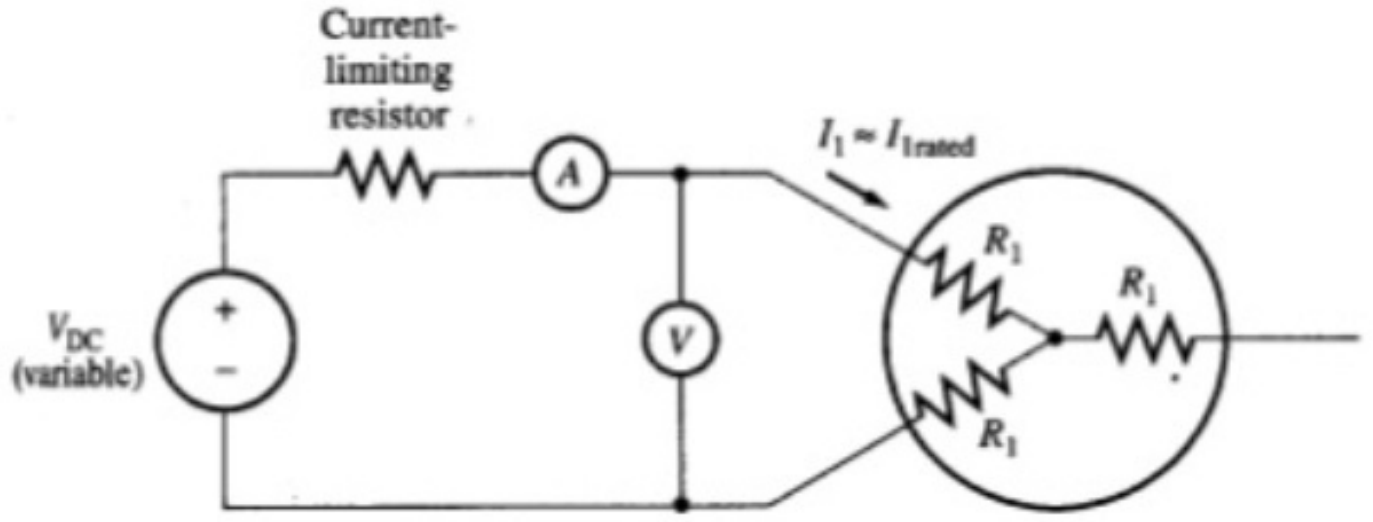
Determination of motor parameters

- Due to the similarity between the induction motor equivalent circuit and the transformer equivalent circuit, same tests are used to determine the values of the motor parameters.
  - DC test: determine the stator resistance R_1
  - No-load test: determine the rotational losses and magnetization current (similar to no-load test in Transformers).
  - Locked-rotor test: determine the rotor and stator impedances (similar to short-circuit test in Transformers).

1

DC test

- The purpose of the DC test is to determine R_1. A variable DC voltage source is connected between two stator terminals.
- The DC source is adjusted to provide approximately rated stator current, and the resistance between the two stator leads is determined from the voltmeter and ammeter readings.



DC test

– then

$$R_{DC} = \frac{V_{DC}}{I_{DC}}$$

– If the stator is Y-connected, the per phase stator resistance is

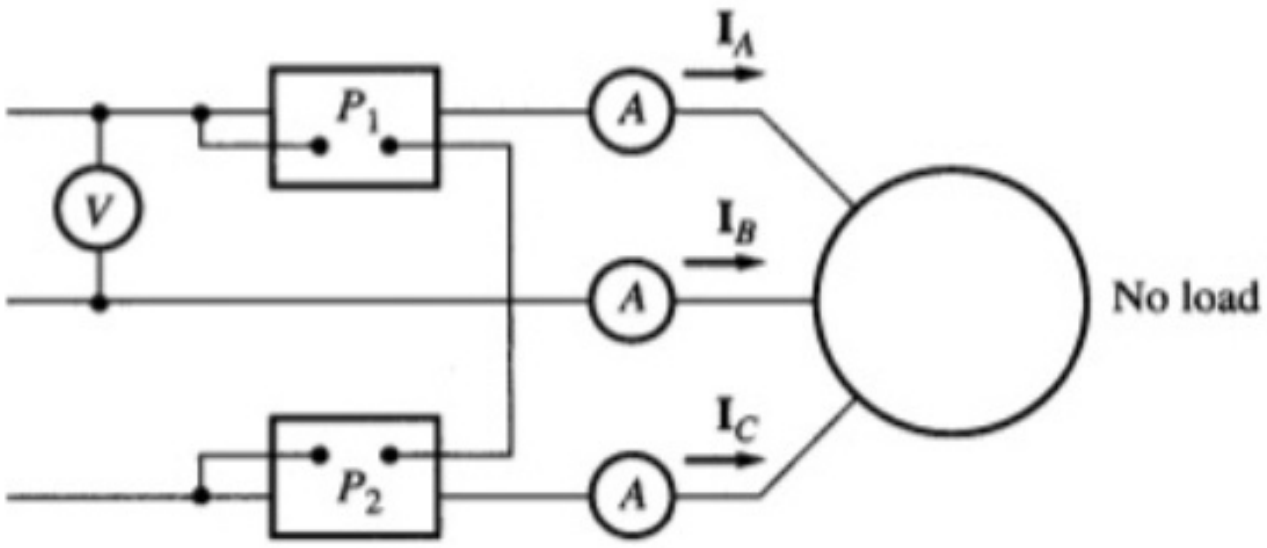
$$R_1 = \frac{R_{DC}}{2}$$

– If the stator is delta-connected, the per phase stator resistance is

$$R_1 = \frac{3}{2} R_{DC}$$

3

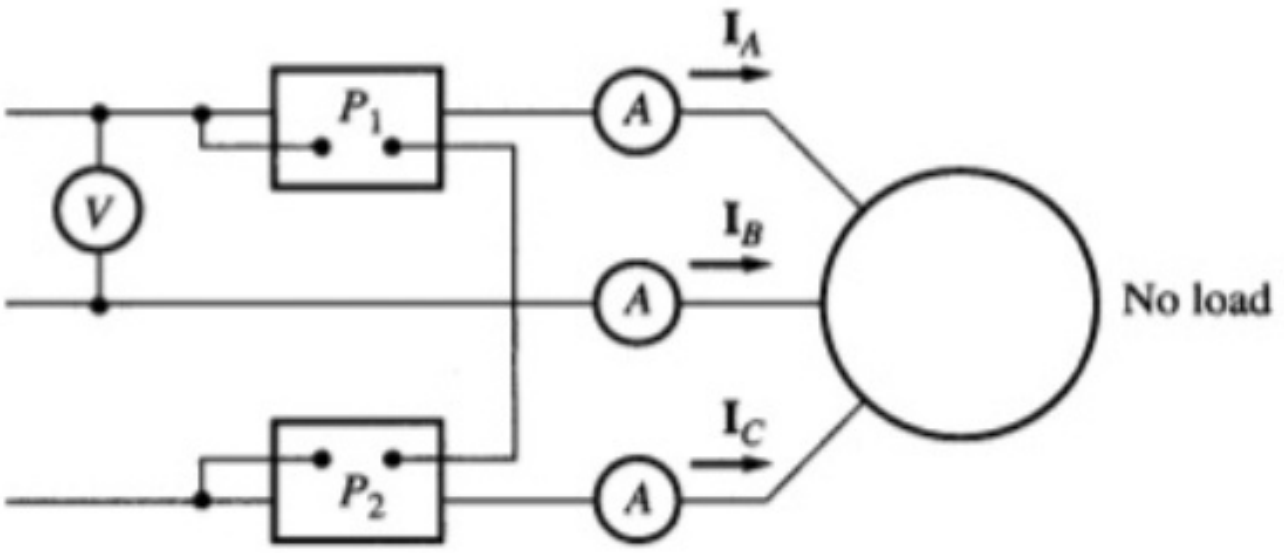
No-load test



1. The motor is allowed to spin freely
2. The only load on the motor is the friction and windage losses, so all P_{conv} is consumed by mechanical losses
3. The slip is very small

4

No-load test



1. The motor is allowed to spin freely
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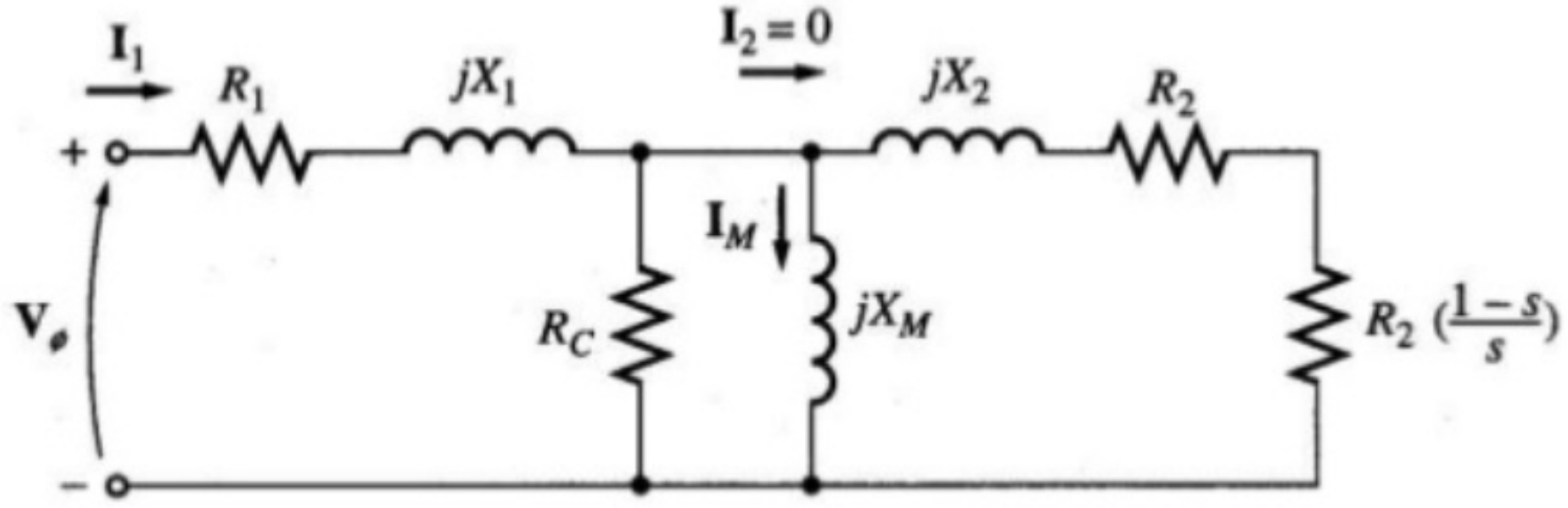
3. The slip is very small

5

No-load test



4. At this small slip

$$\frac{R_2(1-s)}{s} \;?\; R_2 \qquad \& \qquad \frac{R_2(1-s)}{s} \;?\; X_2$$

The equivalent circuit reduces to…

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