

Mechanical-to-Electrical Energy Conversion

3. Dynamics of DC Generators

Hideaki Fujita

fujita@ee.e.titech.ac.jp

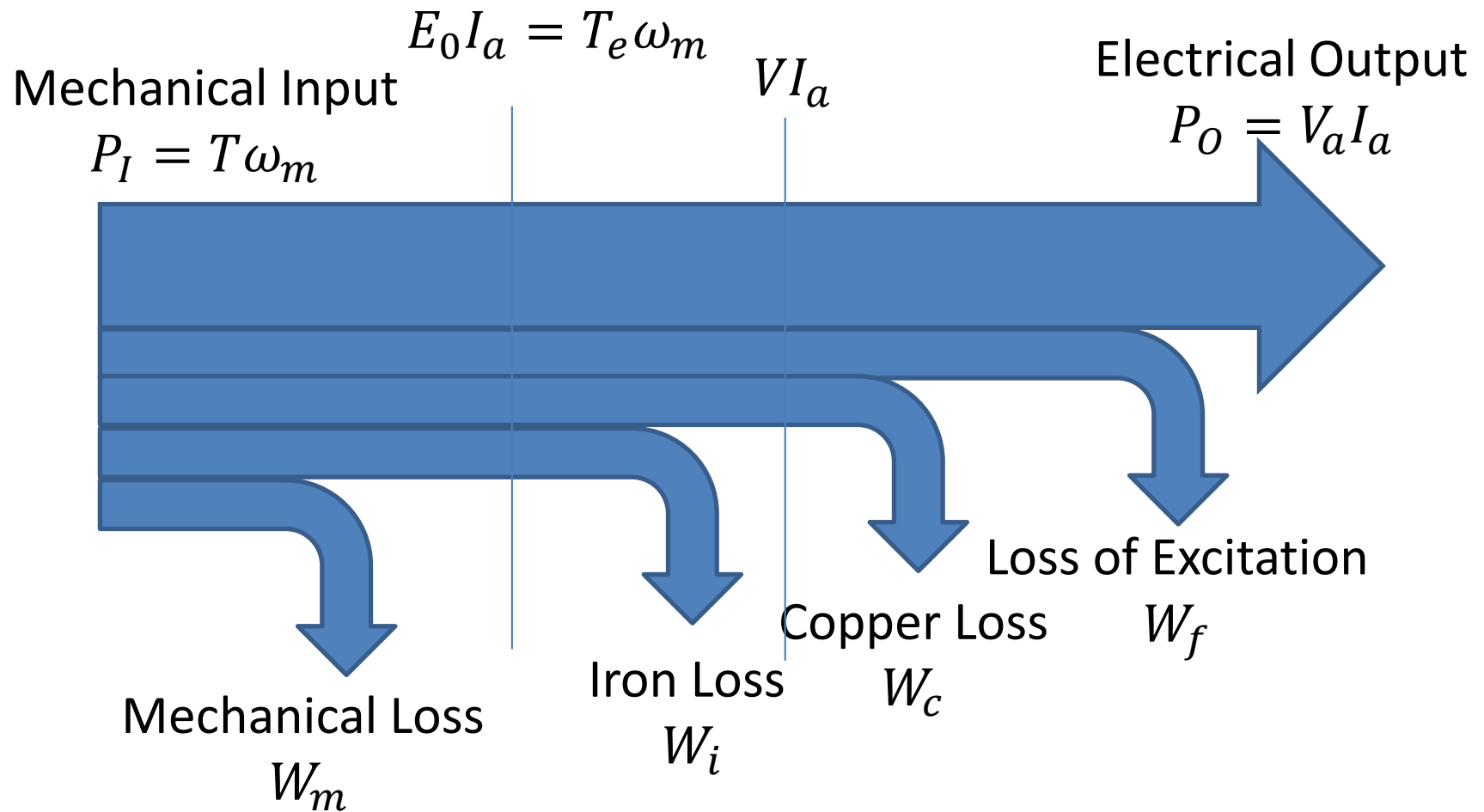


Contents Today

1. Power Losses in a DC Generator
2. Connection of Windings
3. Dynamic Performance of DC Machines



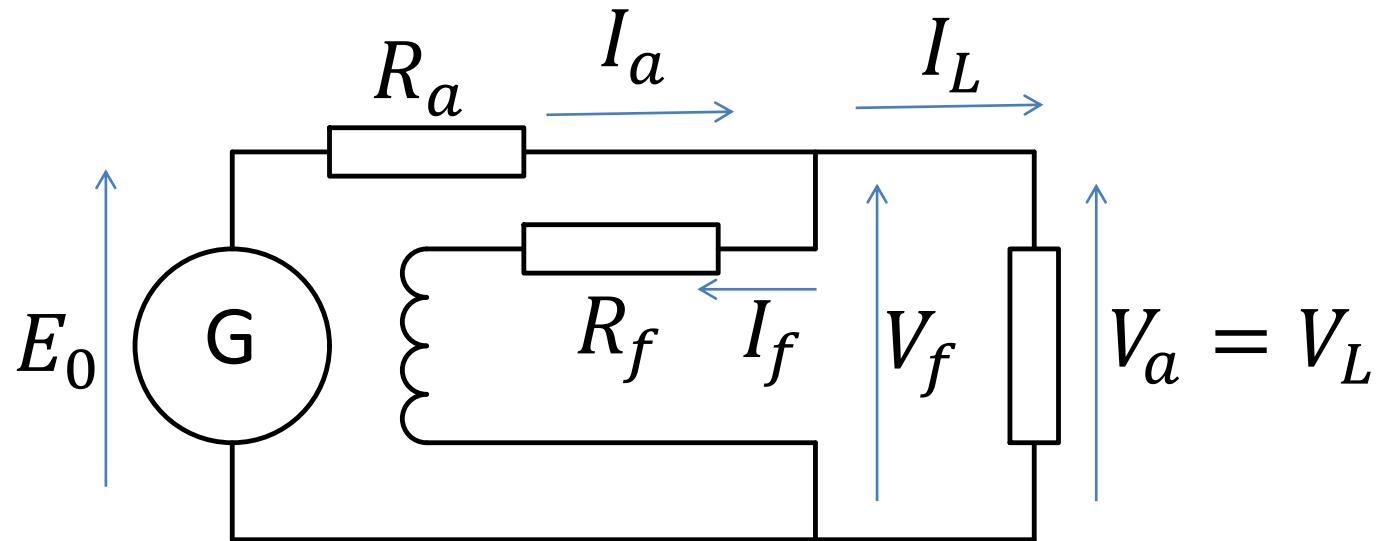
Losses in a DC Generator



$$\text{Efficiency: } \eta = \frac{P_O}{P_I} = \frac{P_O}{P_O + P_{loss}} = \frac{P_I - P_{loss}}{P_I}$$



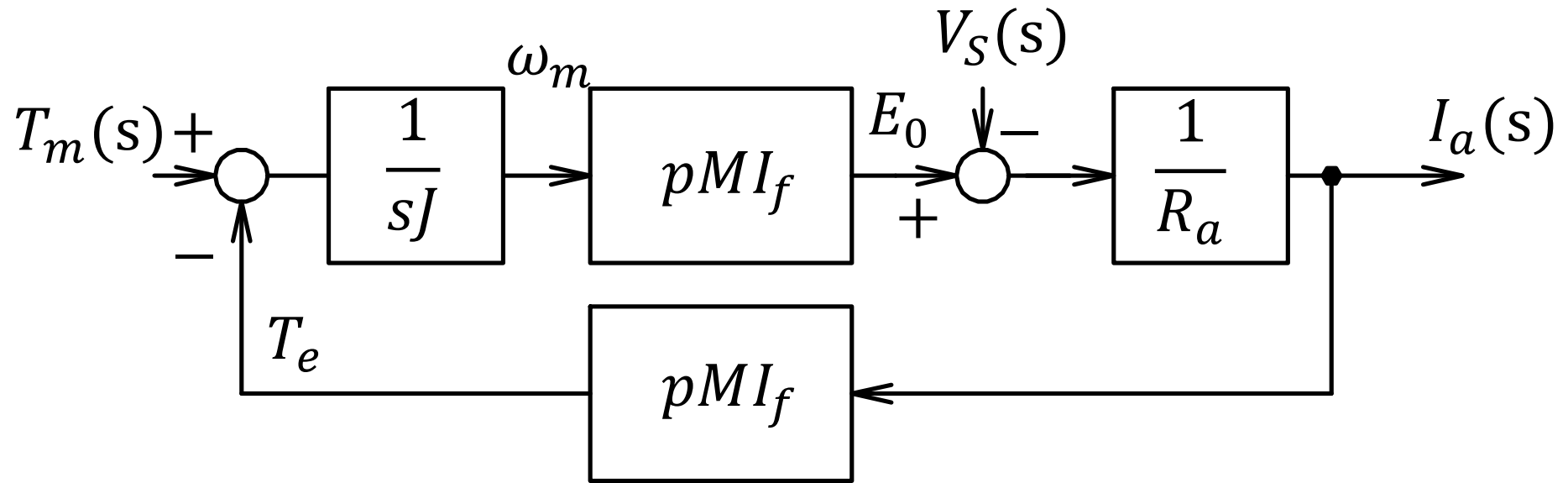
Self Excitation



- **Constant rotating velocity ω_m**
- **Excitation current I_f would not be fixed.**
- **M has a non-linear relationship with I_f .**



Block Diagram of a DC Generator



- First-order Dynamic Response



To be Continued in the Lecture.....

