

본 사이트에서 수업 자료로 이용되는 저작물은 **저작권법 제25조 수업목적저작물 이용 보상금제도**에 의거, **한국복제전송저작권협회와 약정을 체결하고** 적법하게 이용하고 있습니다. 약정범위를 초과하는 사용은 저작권법에 저촉될 수 있으므로 **수업자료의 대중 공개·공유 및 수업 목적 외의 사용을 금지합니다.**

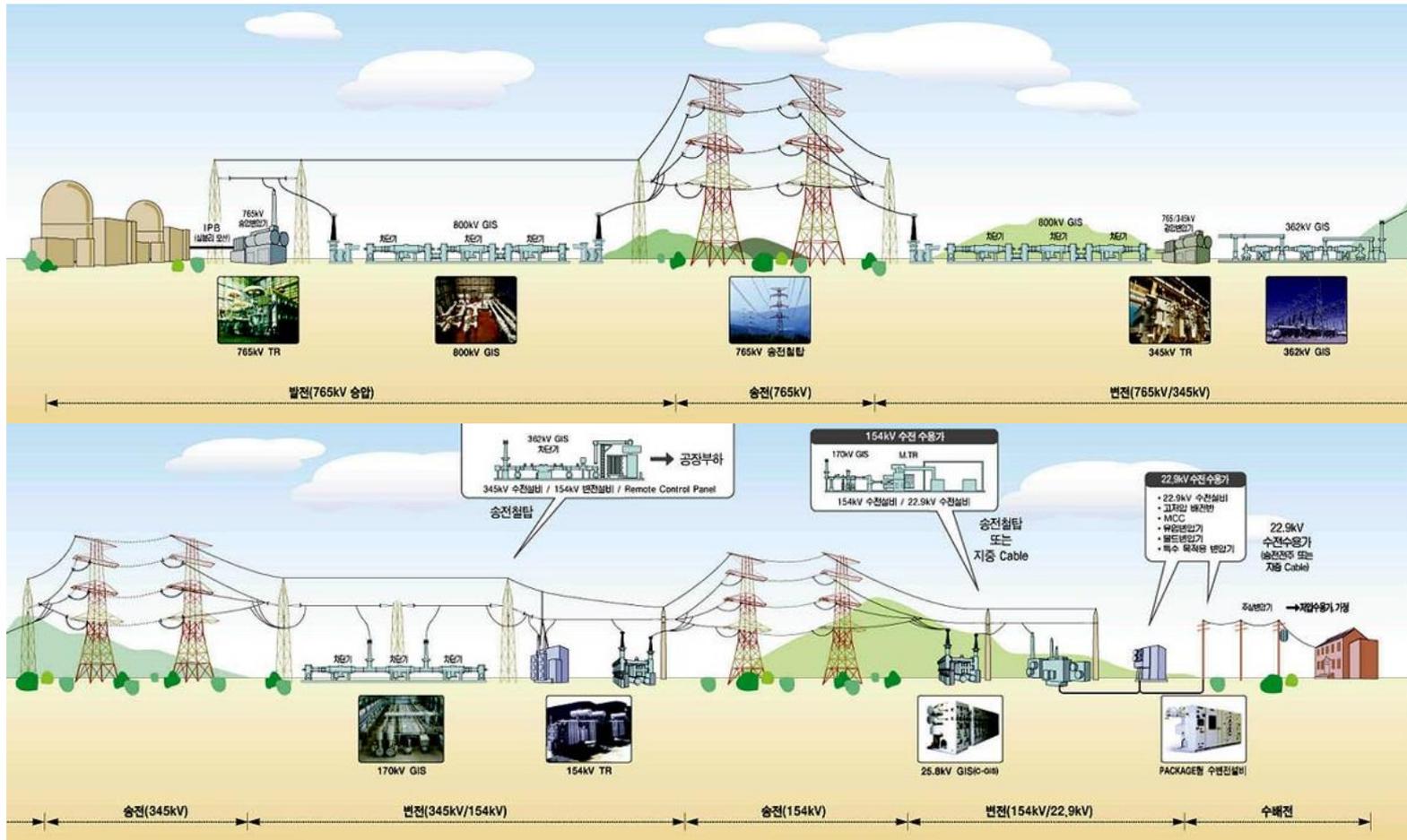
2014. 03. 24.

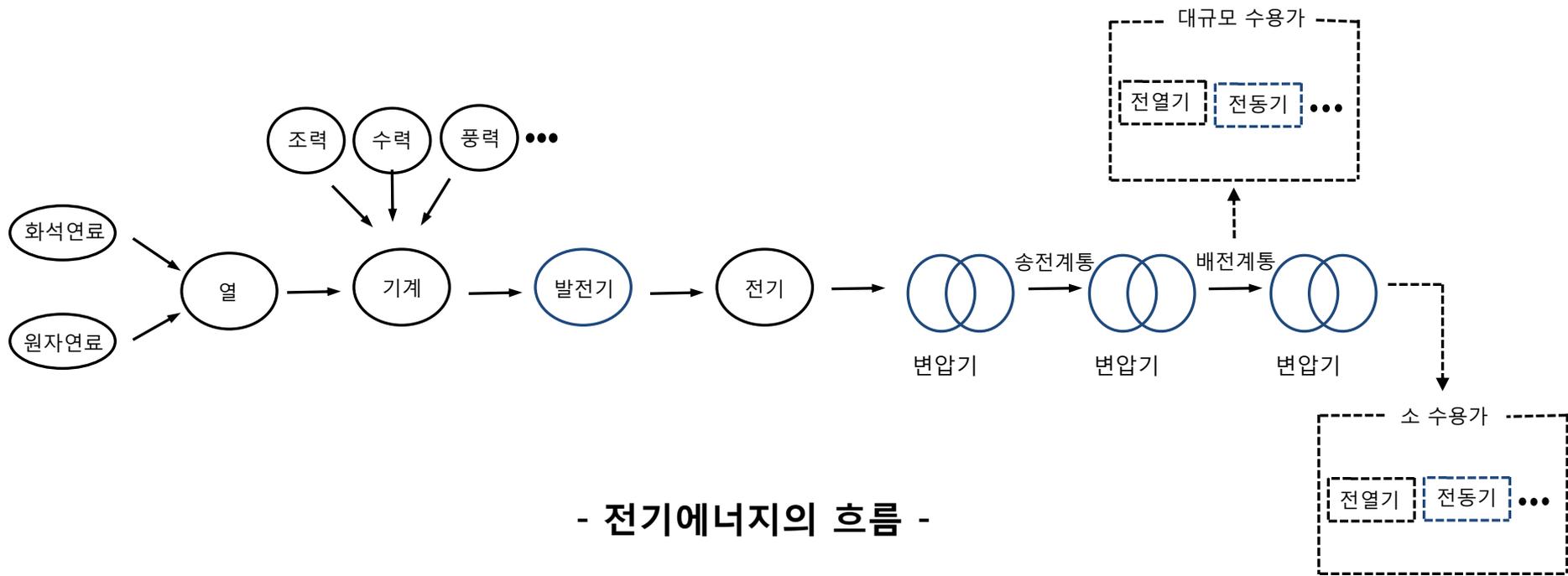
동아대학교·한국복제전송저작권협회

전기기기 개요

1. 전기에너지 (electric energy)
2. 전기기기 구분 (classification of electric machine)
3. 전기기기 구조 (structure of electric machine)
4. 전기기기 운전 (operation of electric machine)
5. 전기기기 특성 분석 및 설계
(characteristic analysis and design of electric machine)
6. 전자에너지 변환 (electromagnetic energy conversion)
7. 전기재료 (electric material)

1. 전기에너지



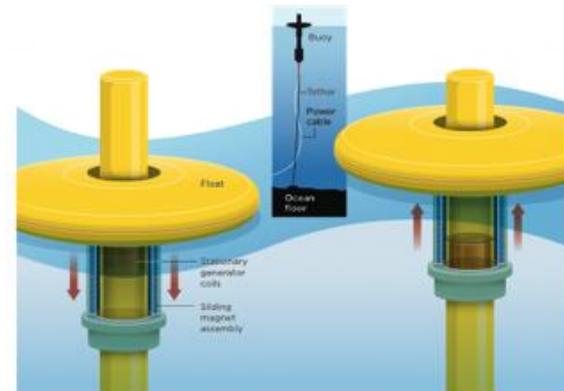
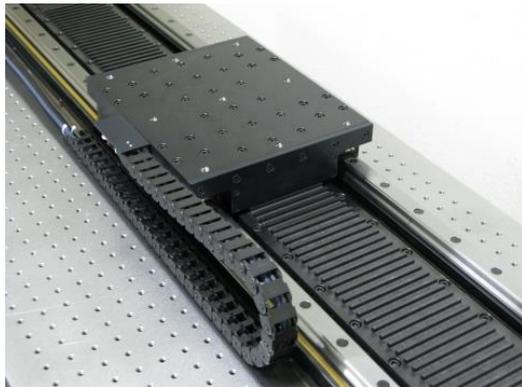


- 전기에너지의 흐름 -



2. 전기기기 구분

(1) 전기-기계 에너지 변환



(2) 전기-전기 에너지 변환



변압기 (transformer)



전력변환장치 (Power converter)



3. 전기기기 구조

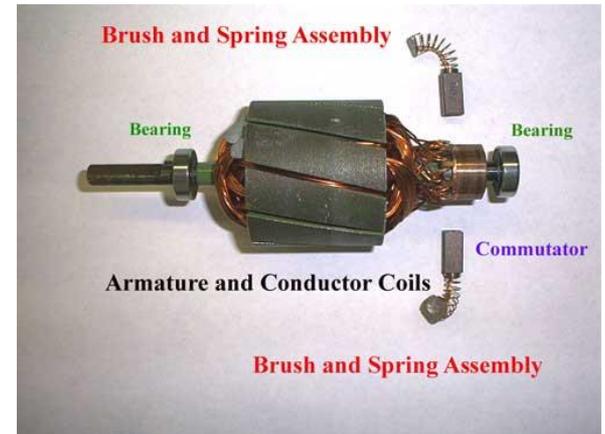
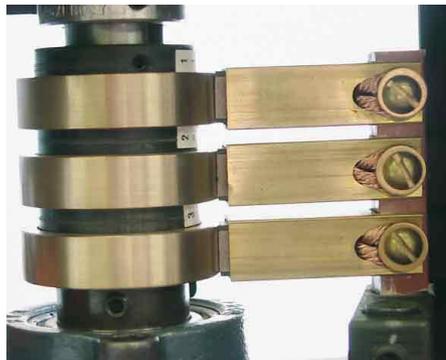
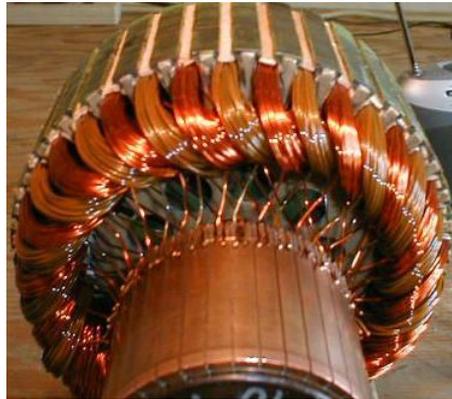
(1) 전자기적인 차원

- 계자 (field) :
- 전기자 (armature) :
- 슬롯 (slot) :
- 치 (tooth) :



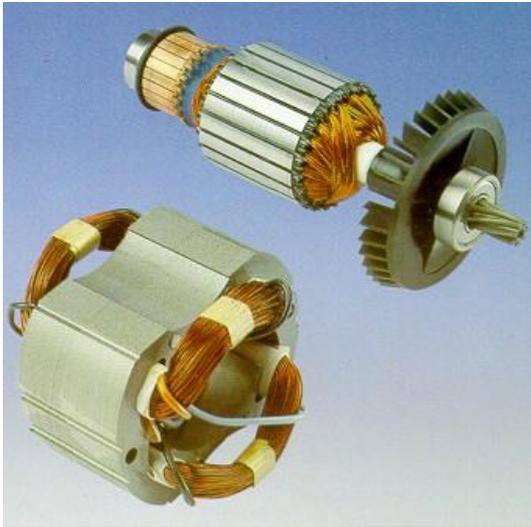
- 브러시(brush)와 슬립링 (slip ring) :

- 브러시(brush)와 정류자 (commutator) :



(2) 기계적인 차원

- 고정자 (stator) :
 -
 - 하우징(housing) :
 - 브라켓(bracket) :



- 회전자 (rotor) :
- 베어링 (bearing) :
- 공극 (airgap) :



4. 전동기 운전

(1) 부하특성

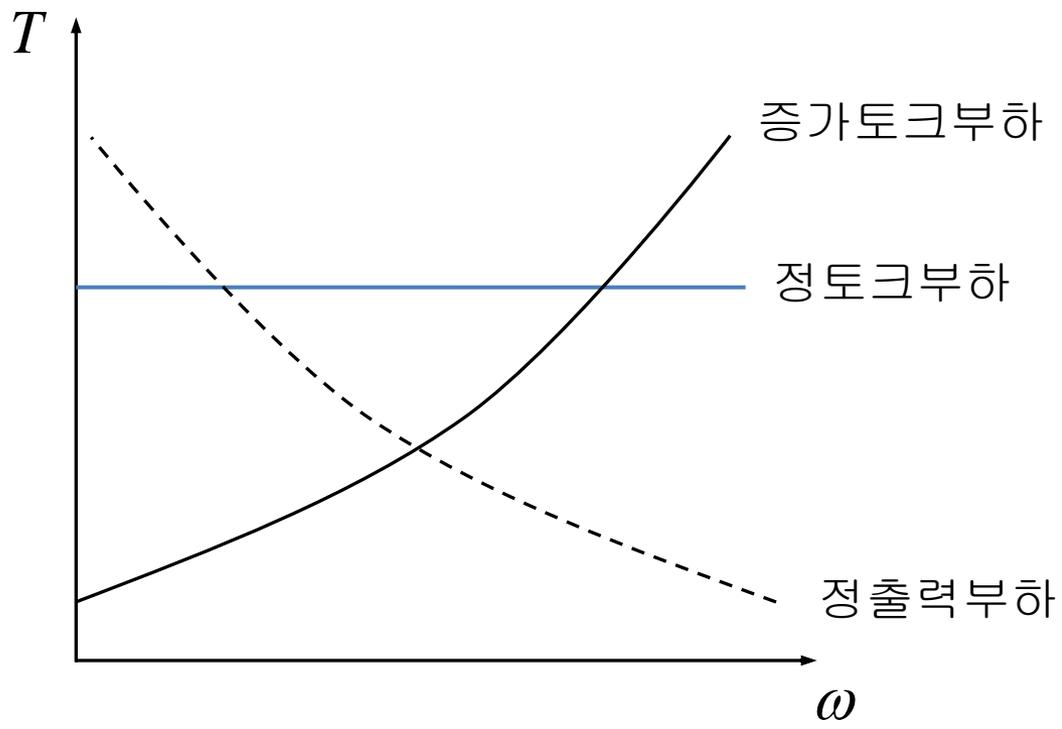
$$T_m(t) = J_m \frac{d\omega_m(t)}{dt} + D\omega_m(t) + K \int_0^t \omega_m(\tau) d\tau + T_L(t)$$

- 부하토크는 전동기의 속도를 결정하는 중요한 요소로 증가토크부하, 정토크부하, 정출력부하로 나눌 수 있음

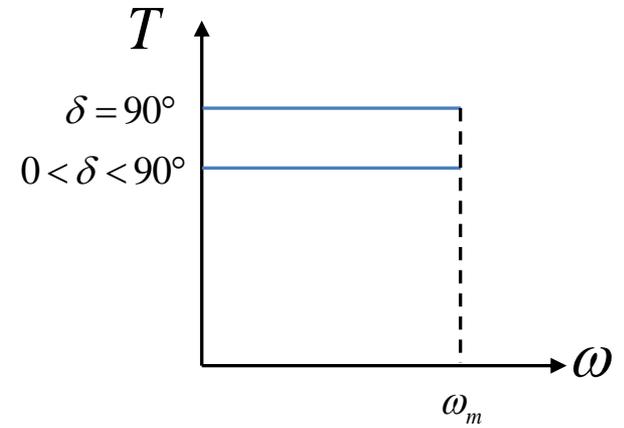
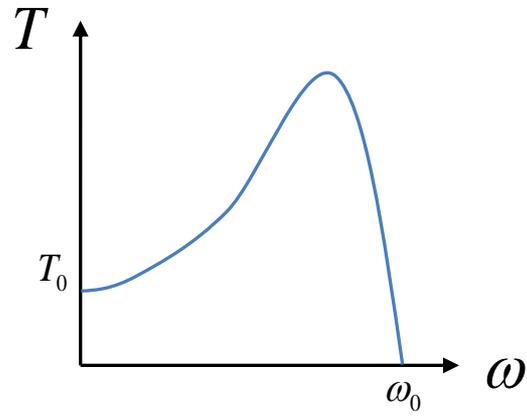
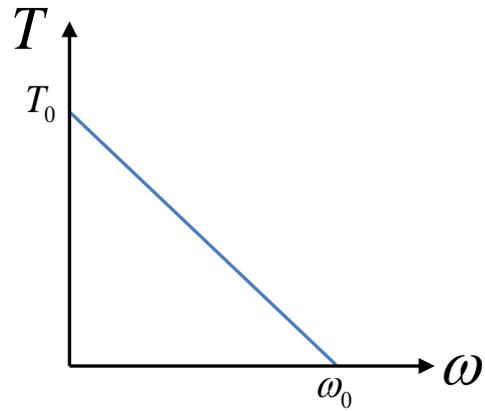
① 증가토크 부하

② 정토크 부하

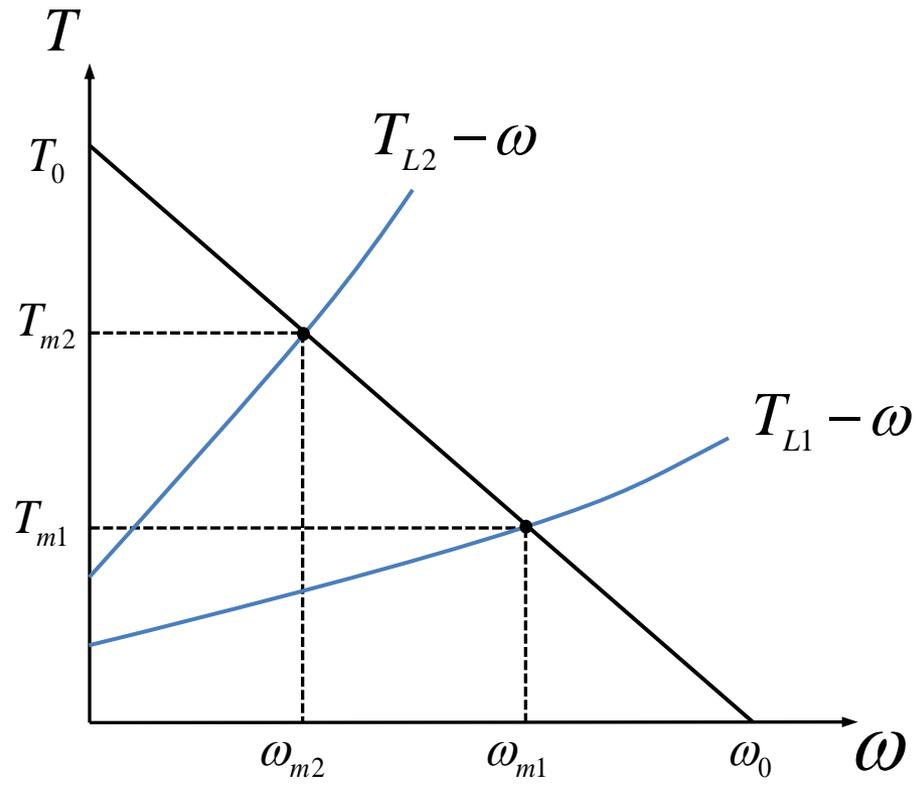
③ 정출력 부하



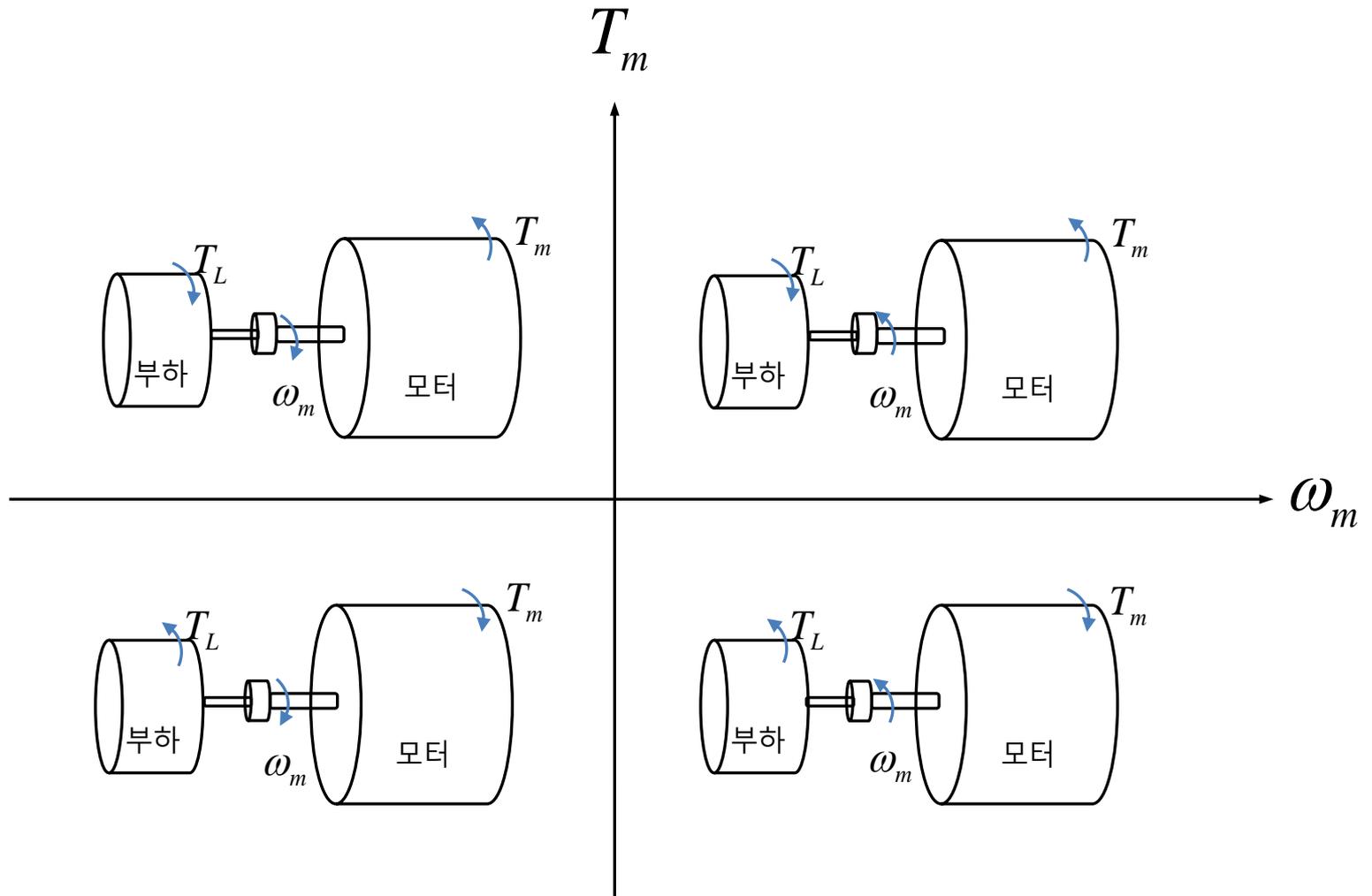
(3) 전동기의 속도-토크 특성



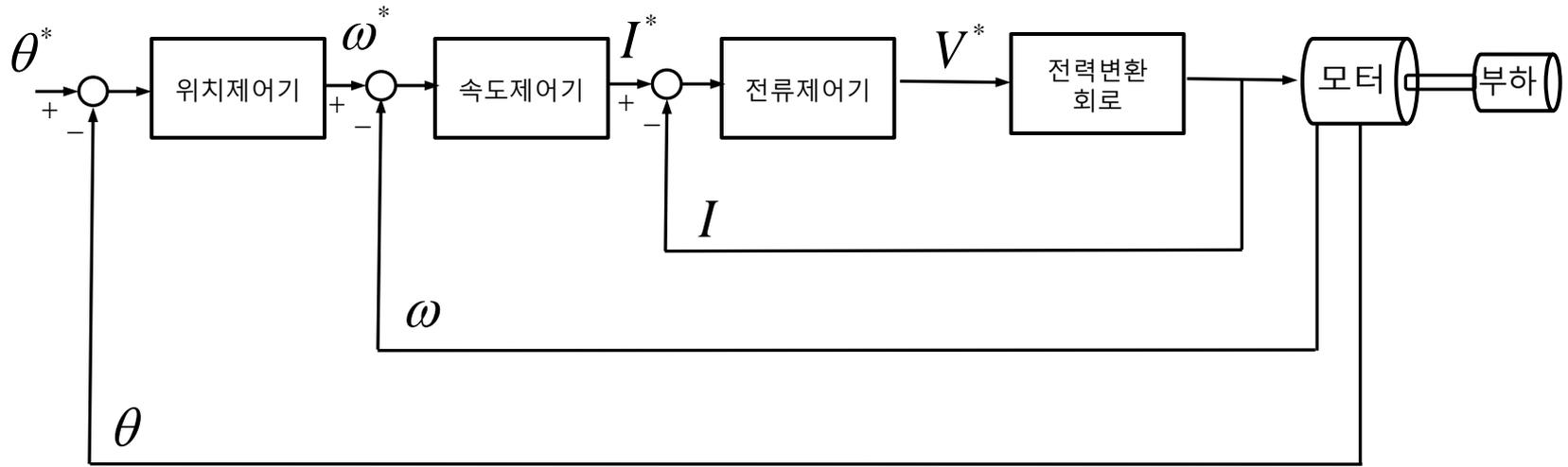
(3) 전동기의 속도결정

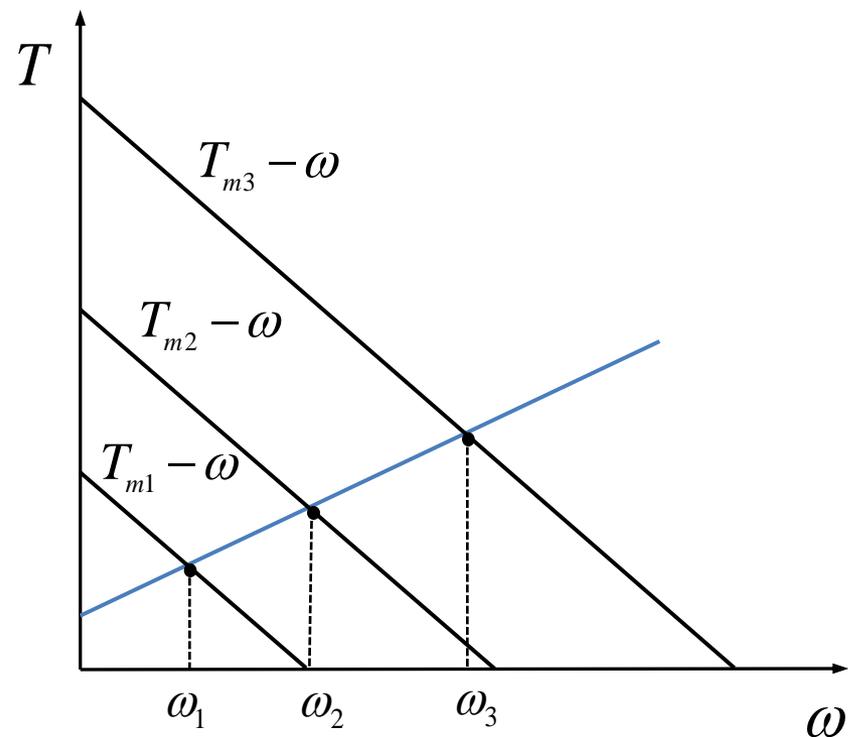
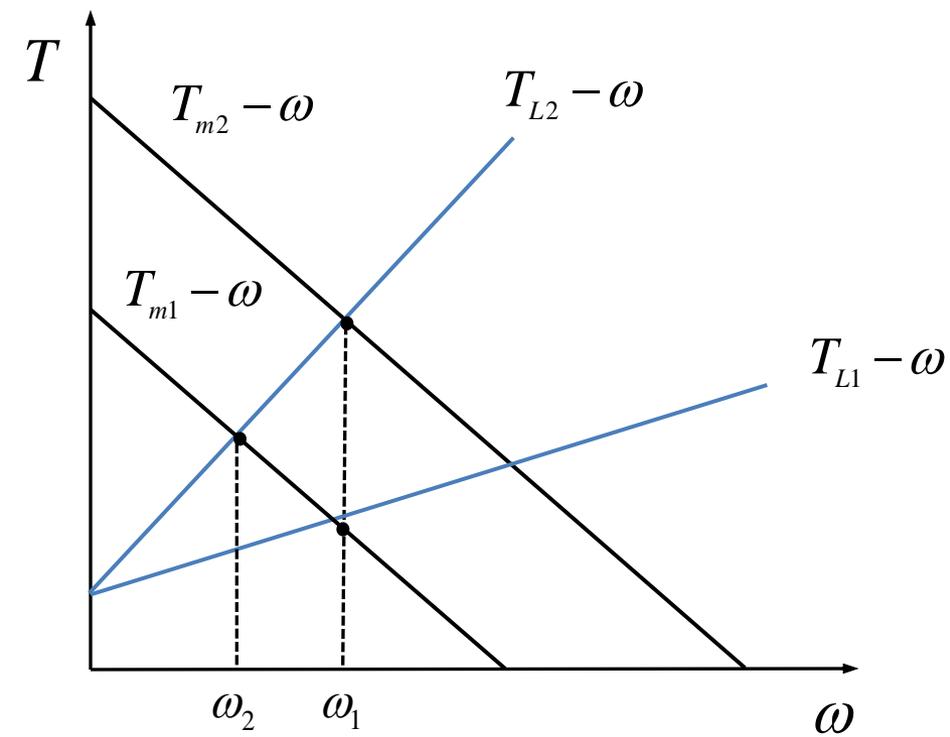


(4) 전기기기의 4상한 운전

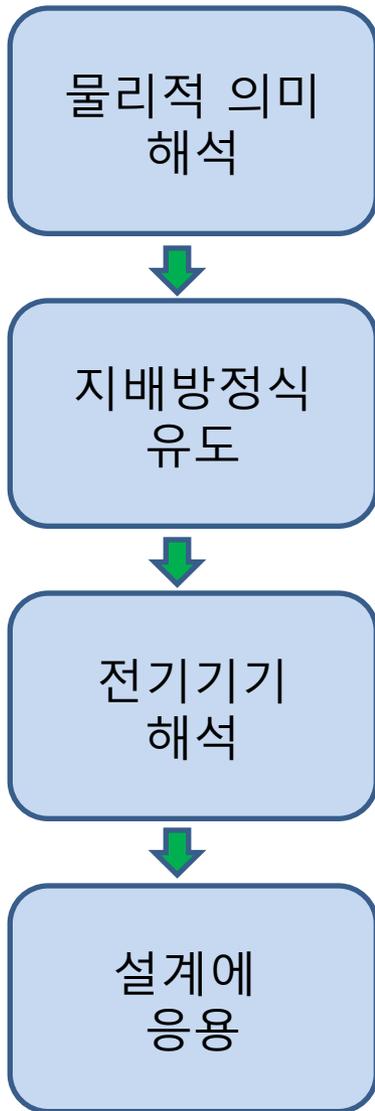


(5) 전동기의 속도제어

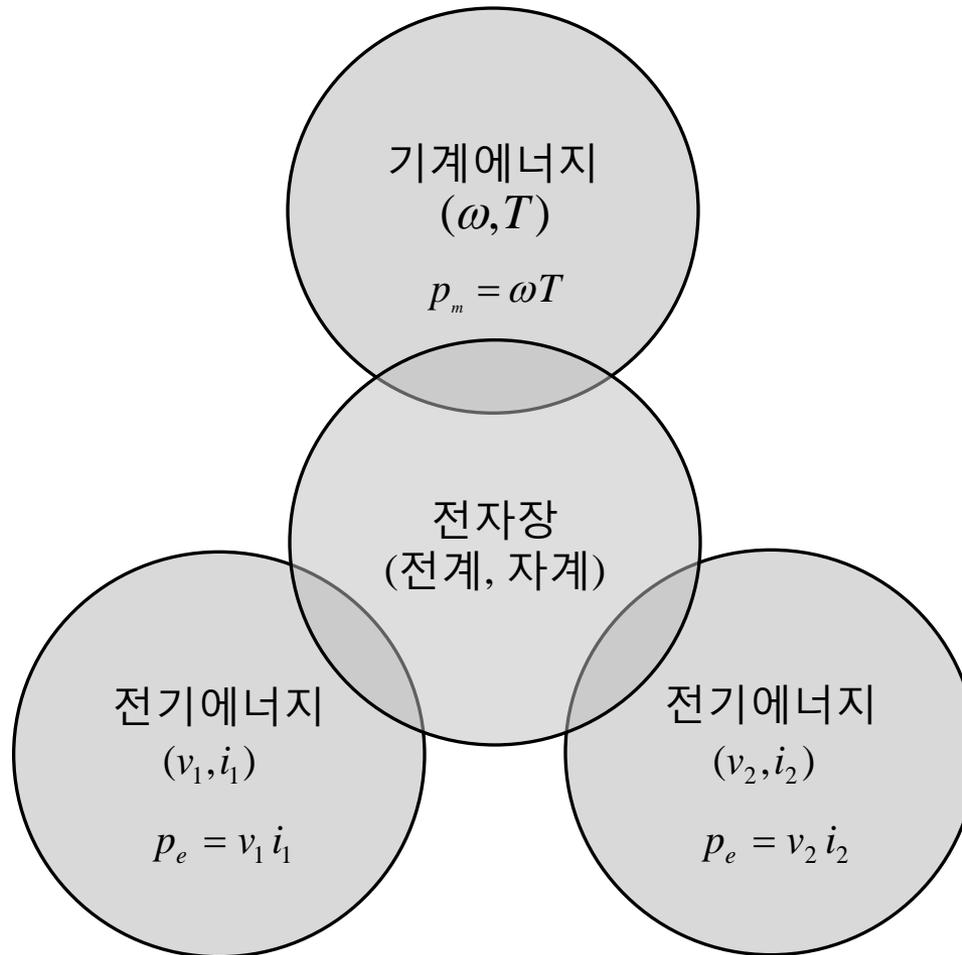




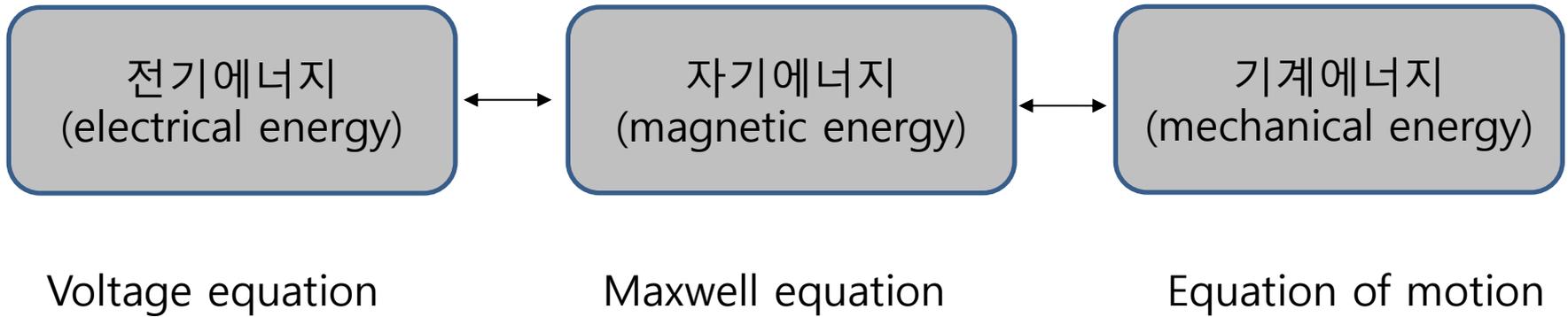
5. 전기기기 특성분석 및 설계



6. 전자에너지 변환



(1) 지배방정식 (governing equation)



※ 전동기 및 발전기에서의 유도기전력과 토크

플레밍의 왼손법칙



플레밍의 오른손법칙



$$\vec{F} = I \vec{L} \times \vec{B} \qquad e = \vec{v} \times \vec{L} \times \vec{B}$$

7. 전기재료

σ

$$10^6 \sim 10^7$$

$$10^{-12} \sim 10^{-17}$$

ϵ

μ

$$>1$$

$$=1$$

$$\begin{aligned} \vec{J} &= \sigma \vec{E} \\ \vec{D} &= \epsilon \vec{E} \\ \vec{B} &= \mu \vec{H} \end{aligned} \quad \left. \begin{array}{l} \text{---} \\ \text{---} \end{array} \right\} \begin{array}{l} \text{전계와 관련} \\ \text{자계와 관련} \end{array}$$

material	$\sigma [s/m]$
silver	6.17×10^7
copper	5.80×10^7
Aluminum	3.82×10^7
iron	1.03×10^7
ferrite	100
Water(fresh)	10^{-3}
polystyrene	10^{-16}

material	ϵ_r
air	1.0006
paper	3
Glass	4~7
Mica	5.4~6

material	μ_r
air	1
Cast iron	60
Powered iron	100
ferrite	1000
Silicon iron	3000
Pure iron	4000