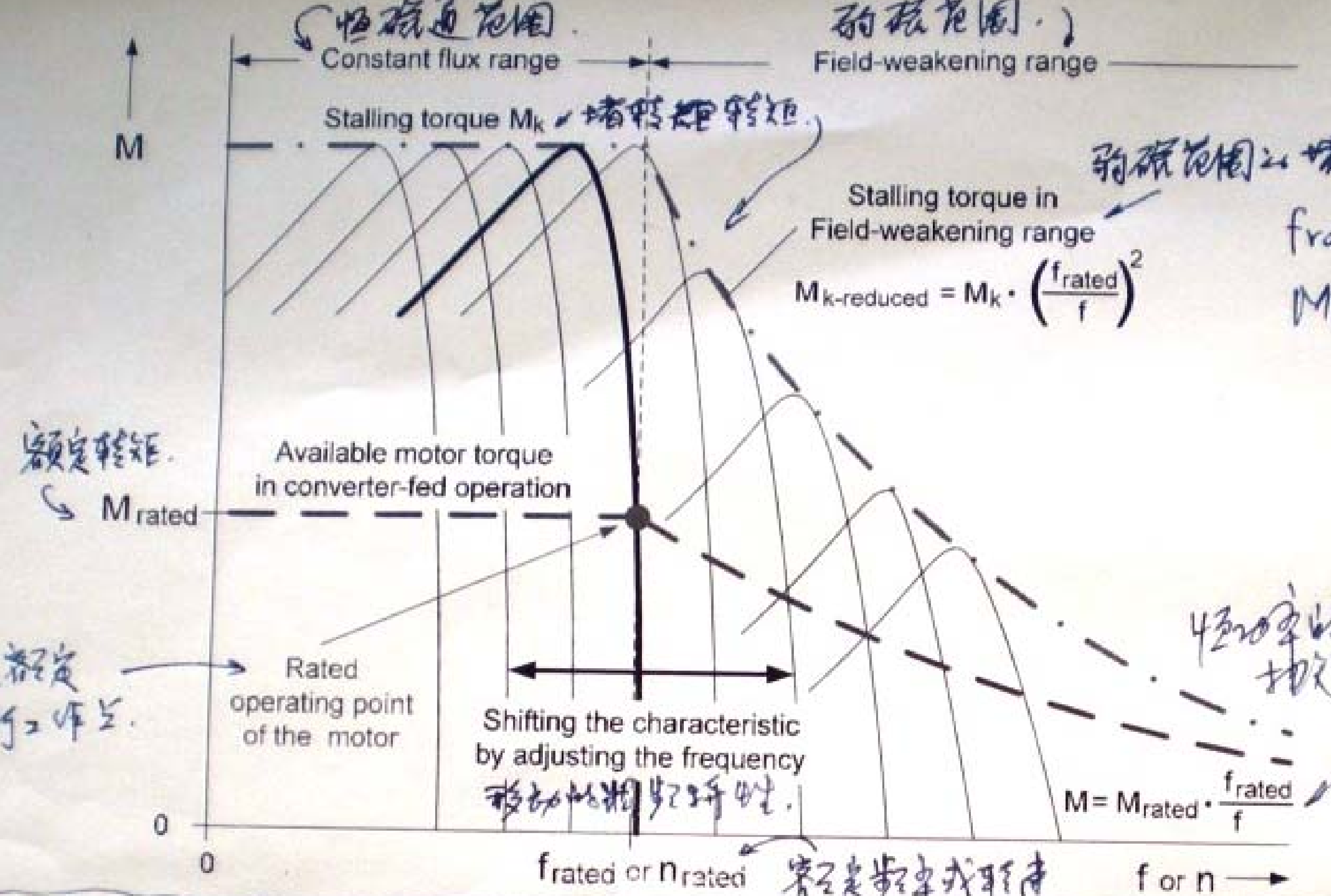

Shifting the speed/torque characteristic of an asynchronous motor by adjusting frequency and voltage

As long as the voltage is adjusted in proportion to the frequency, the ratio between voltage and frequency remains constant and thus also the magnetic flux, the available torque and the stalling torque of the motor. This is known as the constant flux range or the base speed range.

If the frequency is increased further after the maximum possible output voltage of the converter has been reached, the ratio between voltage and frequency decreases again and thus also the magnetic flux in the motor. This is known as the field-weakening range. With asynchronous motors operating in the field weakening range, the available torque M decreases in relation to the rated torque M_{rated} approximately in proportion to the ratio f_{rated}/f. The output power remains constant. The stalling torque in the field-weakening range $M_{k\text{-reduced}}$ decreases in relation to the stalling torque M_k in the constant flux range in proportion to the ratio $(f_{rated}/f)^2$.

as long as. 只要. 在…时候.

is adjusted 被调节. 控制.

in proportion 相称. 在 v/f 调节的时候

frequency. 频率.

ratio 比率.

between — 在…之间. 连接… ~~con~~ remains — 继续保持 constant — 常数. 通量

thus — 因而. 如此. 这样 also — 也, 这样. magnetic — 磁的. 有吸引力的 flux — ~~通量~~

magnetic flux — 磁通量

available — 可利用的. 可获得的. 有效. torque — 扭矩. ~~torque~~ stalling torque. 堵转转矩

range — 环. 环境. 圈, base speed range — 基本速度 (额定转速). 颠覆转矩

constant ~~flux~~ flux range. 恒流范围

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increased — 增加的. further — 更多. 更远. after — 在…之后. maximum — 最大值. 最大

possible — 可能的. 可存在的. converter — 变频器 变流器. reached — 延伸 到达. 达到. 抓住.

ratio — 比率. between — 在…之间. 连接. decreases — 减少. again — 再次. thus 因而. 如此. 这样.

field-~~wealing~~ weakening range. — 弱磁调速范围. asynchronous motors — 异步电机

operating — 运行的. 工作的. available — 有效的. decreases — 减少. relation — 联系. 关系.

approximately — 大致. 接近于. proportion — 比例. 成比例. remains — 继续保持 constant — 常数

stalling torque 堵转转矩. 颠覆转矩. constant flux range — 恒流范围. proportion 相称. ratio 比率.

$M_A = M_K \left(\frac{f_{rated}}{f}\right)^2$ —— ①

$M_B = M_{rated} \left(\frac{f_{rated}}{f}\right)$ —— ②

$M_K = K M_{rated}$ —— ③

$$\frac{M_A}{M_B} = \frac{P_A}{P_B} = 2.2 \frac{f_{rated}}{f} = K \frac{f_{rated}}{f}$$

式中. M_A 为 $f > f_{rated}$ 时的最大过载扭矩

M_B 为 $f > f_{rated}$ 时的额定恒功率扭矩.

K 为最大过载倍数

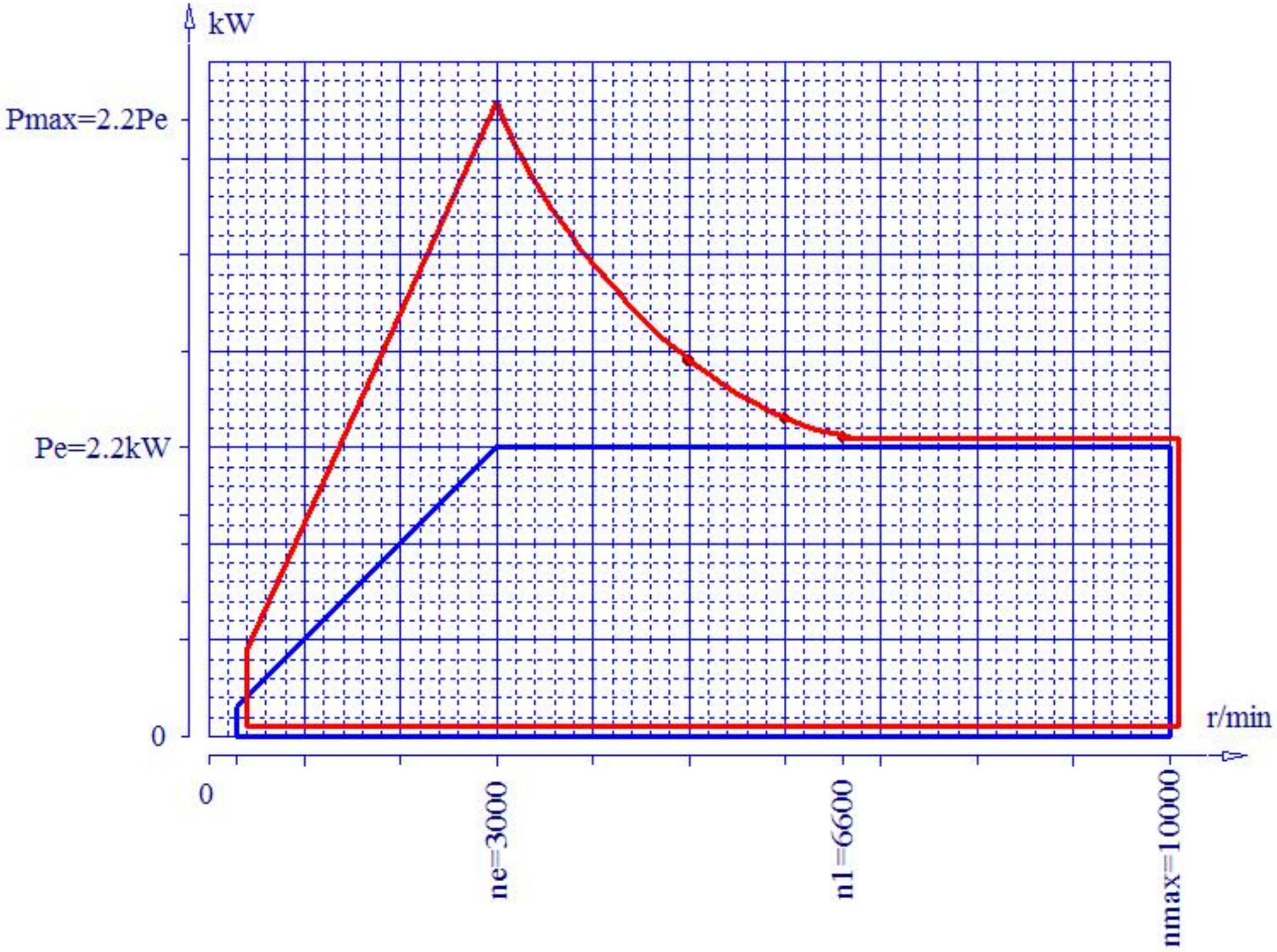
①. 计算最大过载倍数下，达到额定恒功率交点时的频率值. 也就是说超过这个频率值. 电机已经没有过载能力了。

令: $M_A / M_B = 1$ 由①式/②式有: $f = K f_{raded}$. ③式代入①式后求得

③过载倍数受频率影响. 说明电机过载最强之范围.

②. 计算过载(最大)对恒功率/频率关系. ①/②式

$$\frac{M_A}{M_K} = \frac{P_A - \text{最大过载}}{P_B - \text{恒功率}} = K \frac{f_{rated}}{f}$$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