# MEDAN MAGNETIK TUNAK

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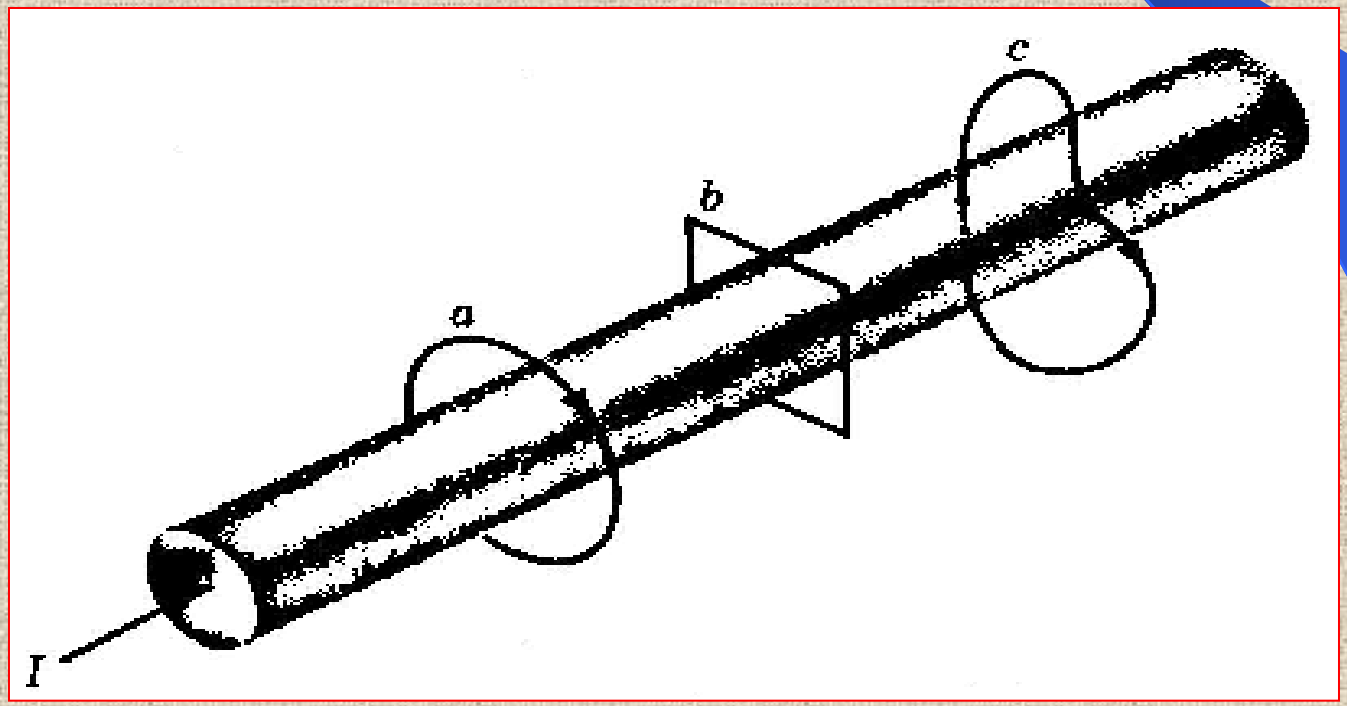
# HUKUM INTEGRAL AMPERE

Integral garis **H** sepanjang lintasan tertutup sama dengan arus searah yang terlingkung oleh lintasan tersebut.

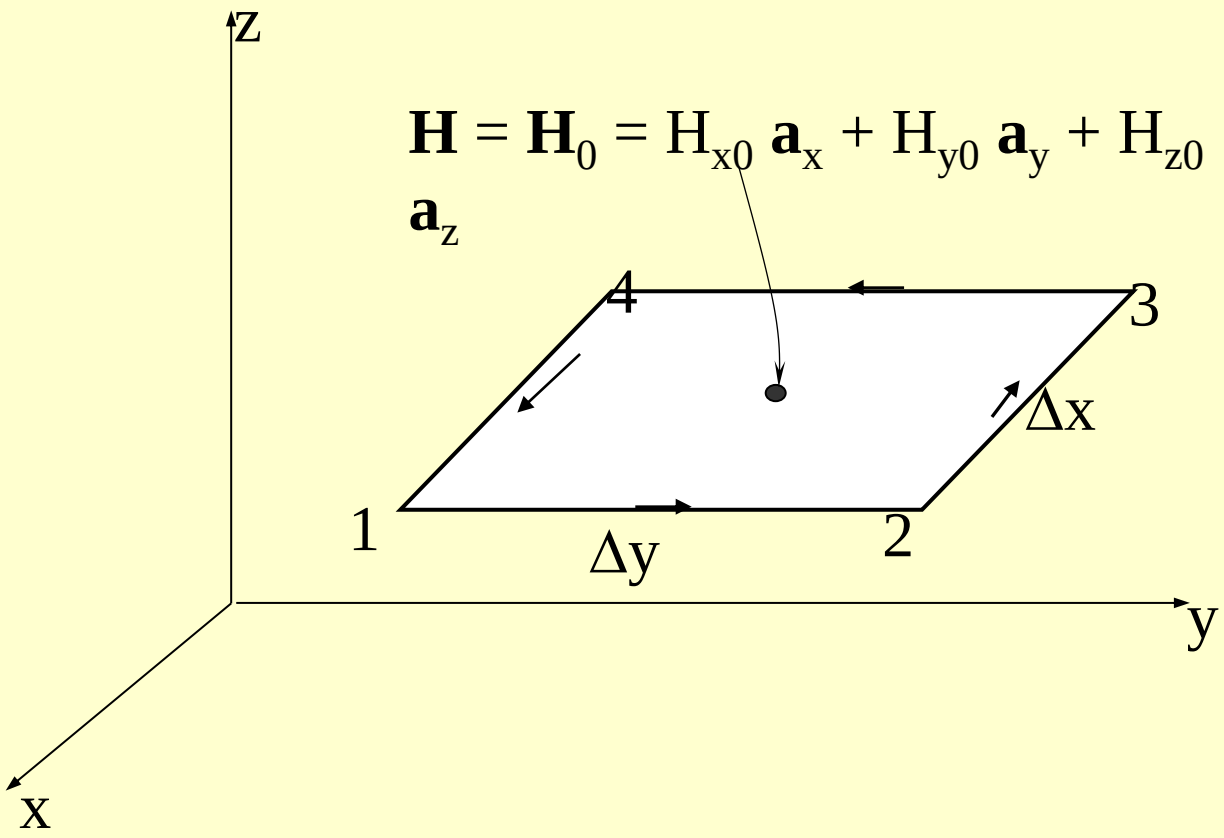
$$\oint \mathbf{H}.\, d\mathbf{L} = I$$

**Konduktor yang dialiri arus listrik I, dengan lintasan a dan b memenuhi hukum integral Ampere, sedang lintasan c tidak memenuhi.**



# KURL

$$\mathbf{H} = \mathbf{H}_0 = H_{x0}\,\mathbf{a}_x + H_{y0}\,\mathbf{a}_y + H_{z0}\,\mathbf{a}_z$$



# KURL

$$(\text{Curl } \mathbf{H})_n = \lim_{\Delta S_n \to 0} \frac{\oint \mathbf{H}.\, d\mathbf{L}}{\Delta S_n}$$

$$\text{Curl } \mathbf{H} = \nabla \times \mathbf{H}$$

# Sistem Koordinat Kartesian

$$\text{Curl}\,\mathbf{H} = \left(\frac{\partial H_y}{\partial x} - \frac{\partial H_x}{\partial y}\right)\mathbf{a}_x + \left(\frac{\partial H_z}{\partial y} - \frac{\partial H_y}{\partial z}\right)\mathbf{a}_y + \left(\frac{\partial H_x}{\partial z} - \frac{\partial H_z}{\partial x}\right)\mathbf{a}_z$$

$$Curl\,\mathbf{H} = \begin{vmatrix} \mathbf{a}_x & \mathbf{a}_y & \mathbf{a}_z \\ \dfrac{\partial}{\partial x} & \dfrac{\partial}{\partial y} & \dfrac{\partial}{\partial z} \\ H_x & H_y & H_z \end{vmatrix}$$

# Kurl Sistem Koordinat Tabung

$$\nabla \times \mathbf{H} = \left( \frac{1}{\rho} \frac{\partial H_z}{\partial \phi} - \frac{\partial H_\phi}{\partial z} \right) \mathbf{a}_\rho + \left( \frac{\partial H_\rho}{\partial z} - \frac{\partial H_z}{\partial \rho} \right) \mathbf{a}_\phi + \left( \frac{1}{\rho} \frac{\partial (\rho H_\phi)}{\partial \rho} - \frac{1}{\rho} \frac{\partial H_\rho}{\partial \phi} \right) \mathbf{a}_z$$

# Kurl Sistem Koordinat Bola

$$\nabla \times \mathbf{H} = \frac{1}{r\sin\theta}\left[\frac{\partial(H_\phi \sin\theta)}{\partial\theta} - \frac{\partial H_\theta}{\partial\phi}\right]\mathbf{a}_r + \frac{1}{r}\left[\frac{1}{\sin\theta}\frac{\partial(H_r)}{\partial\phi} - \frac{\partial(rH_\phi)}{\partial r}\right]\mathbf{a}_\theta$$

$$+\frac{1}{r}\left[\frac{\partial(rH_\theta)}{\partial r} - \frac{\partial H_r}{\partial\theta}\right]\mathbf{a}_\phi$$

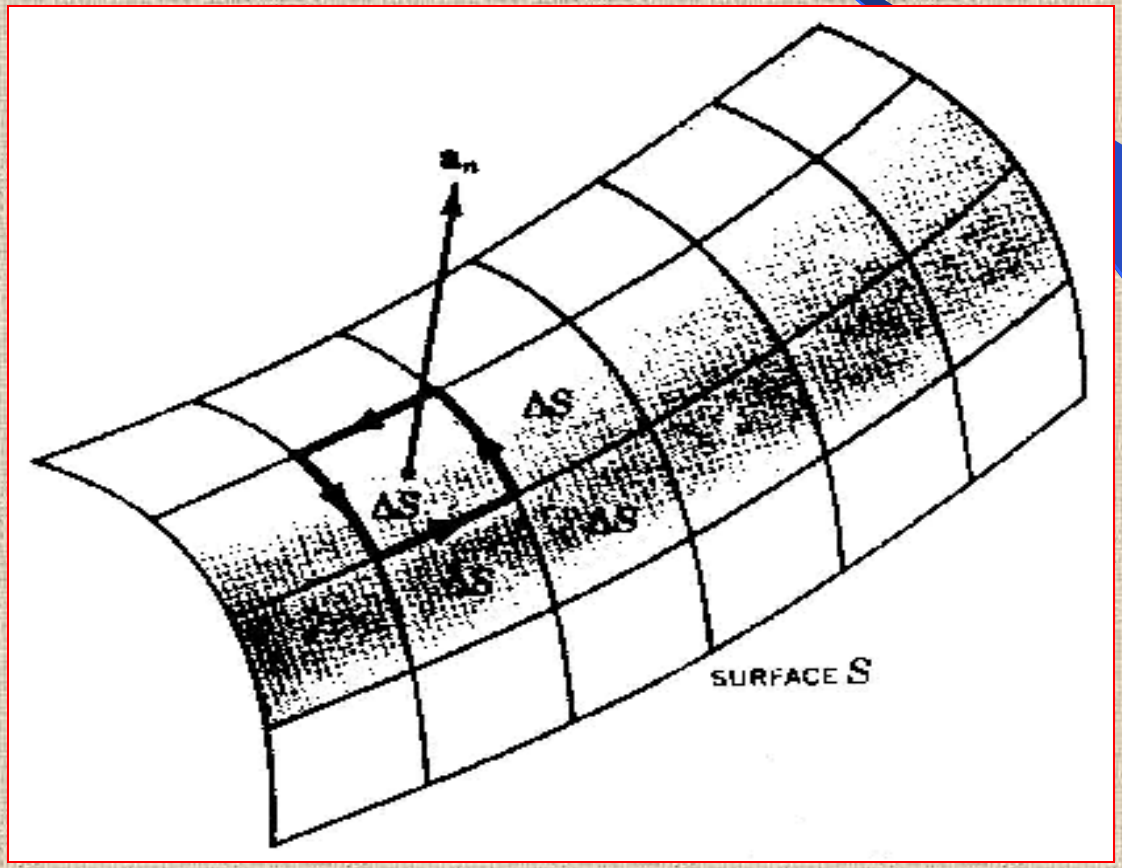
# TEOREMA STOKES

$$\frac{\oint \mathbf{H} \cdot d\mathbf{L}_{\Delta s}}{\Delta S} = (\nabla \times \mathbf{H})_n$$

$$\frac{\oint \mathbf{H} \cdot d\mathbf{L}_{\Delta s}}{\Delta S} = (\nabla \times \mathbf{H}) \cdot \mathbf{a}_n$$

$$\oint \mathbf{H} \cdot d\mathbf{L}_{\Delta s} = (\nabla \times \mathbf{H}) \cdot \mathbf{a}_n \Delta S = (\nabla \times \mathbf{H}) \cdot \Delta \mathbf{S}$$

# Ilustrasi dari suatu daerah ΔS dan permukaan S



# *teorema Stokes*

$$\oint \mathbf{H} \cdot d\mathbf{L} \equiv \int_S (\nabla \times \mathbf{H}) \cdot \Delta \mathbf{S}$$

# TERIMA KASIH