Structured Electronic Design
Feedback model of Black

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Invention of negative feedback

Invention of negative feedback

1927: Black: first negative feedback amplifier

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1932: Black: Wave translation system

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Black's feedback model

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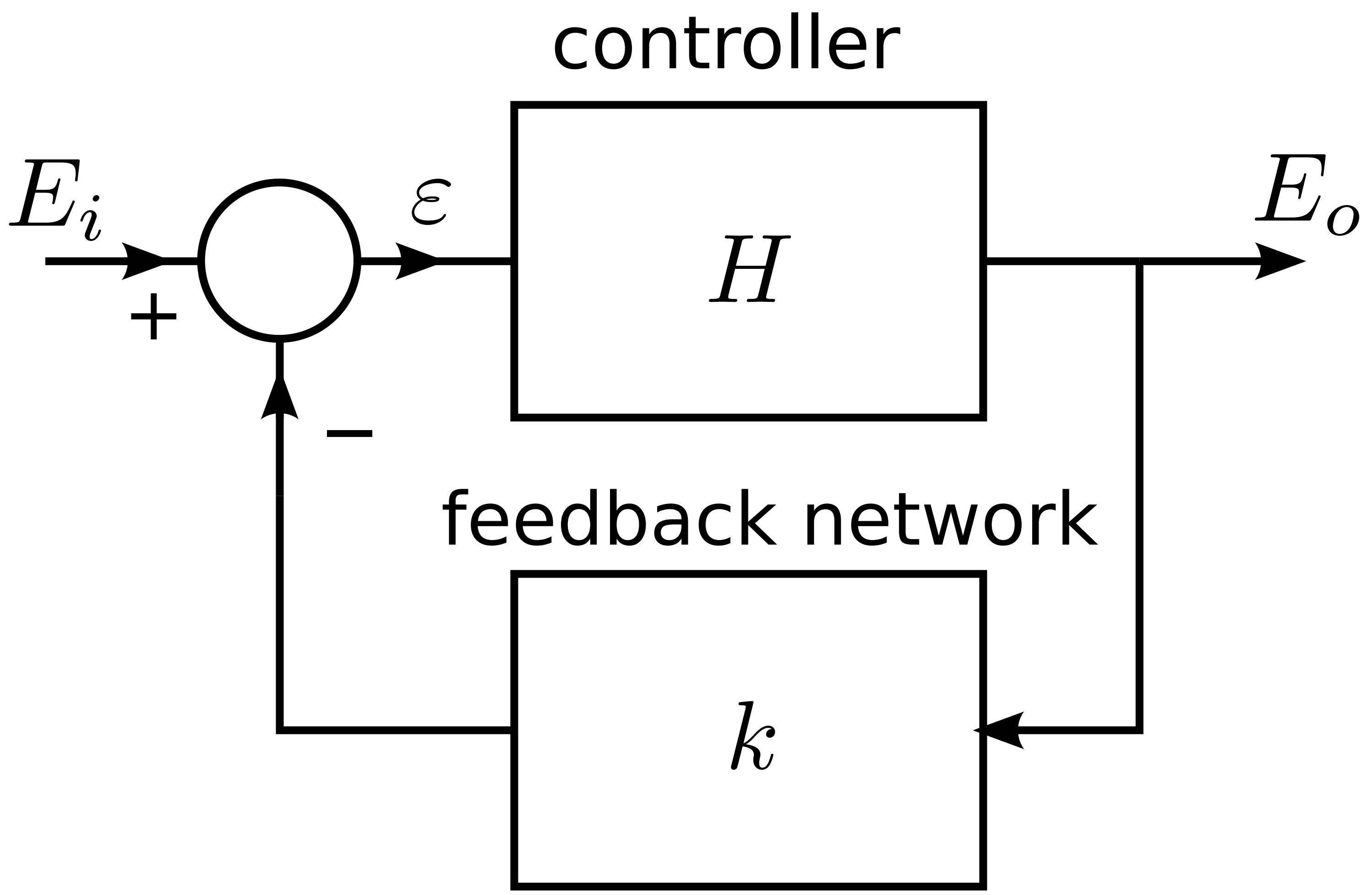

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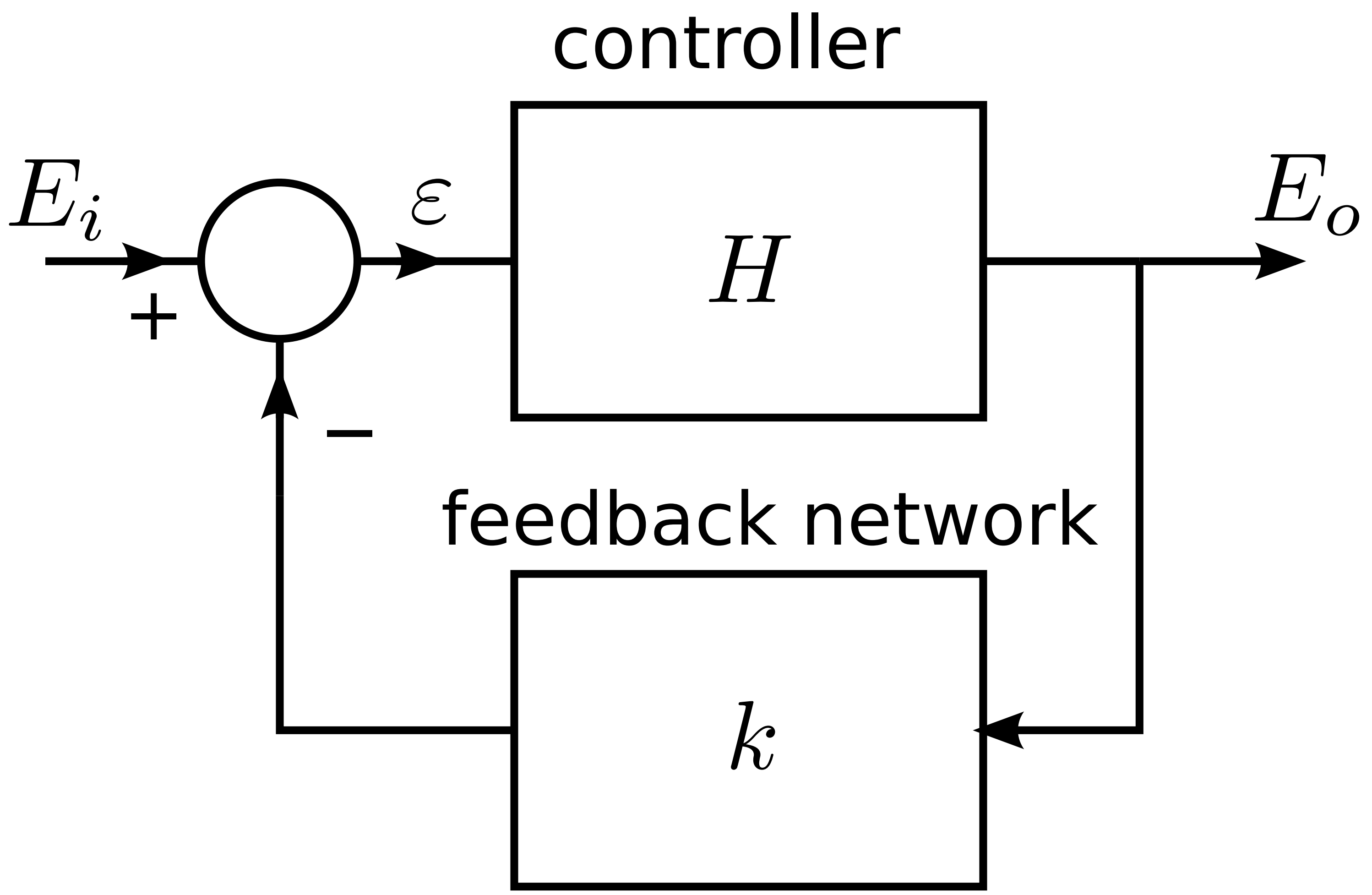

Equations:

$$\varepsilon = E_i - kE_o,$$
$$\varepsilon = \frac{1}{H}E_o.$$

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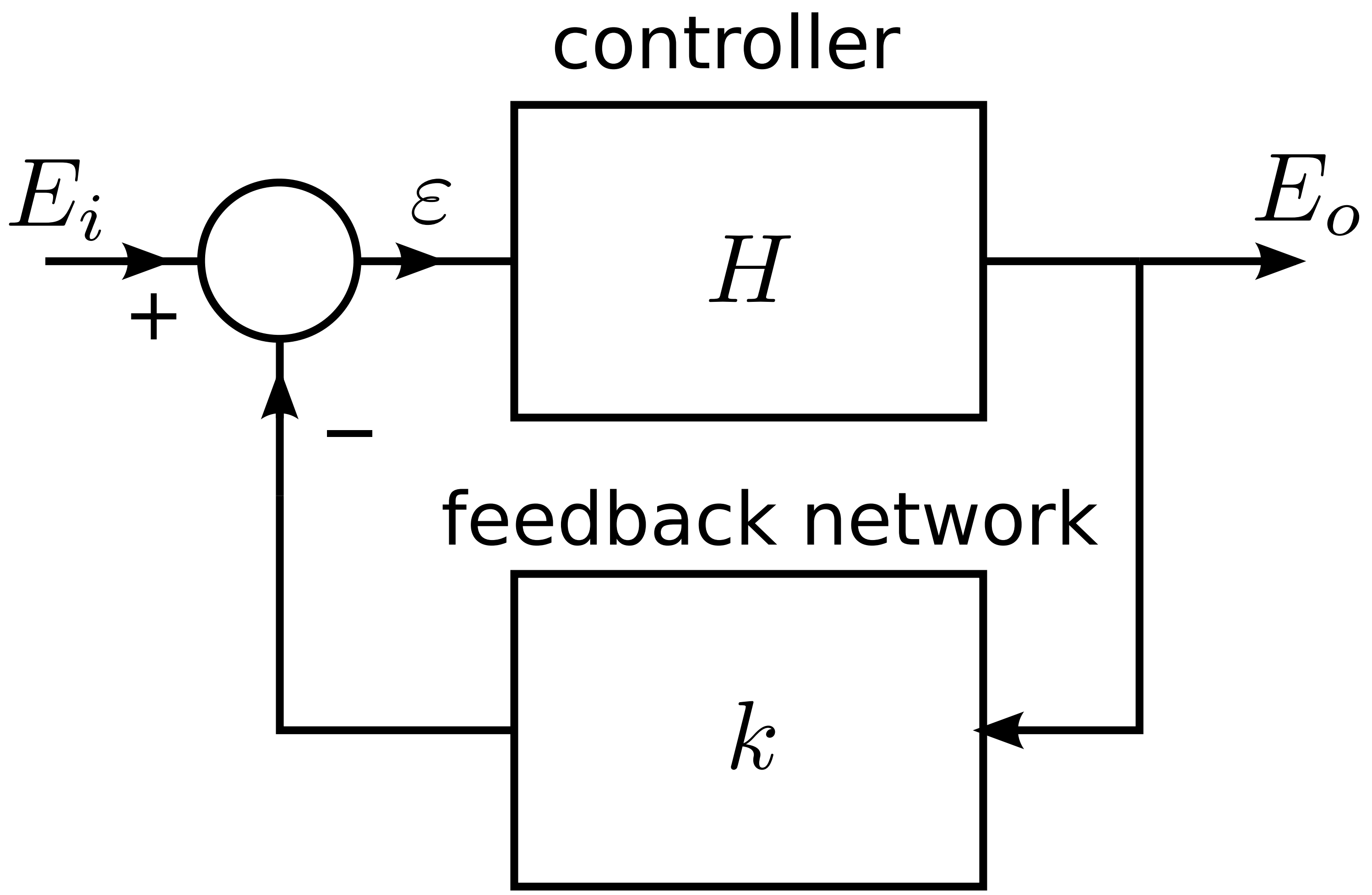

Input-output transfer:

$$\frac{E_o}{E_i} = \frac{H}{1+Hk}$$

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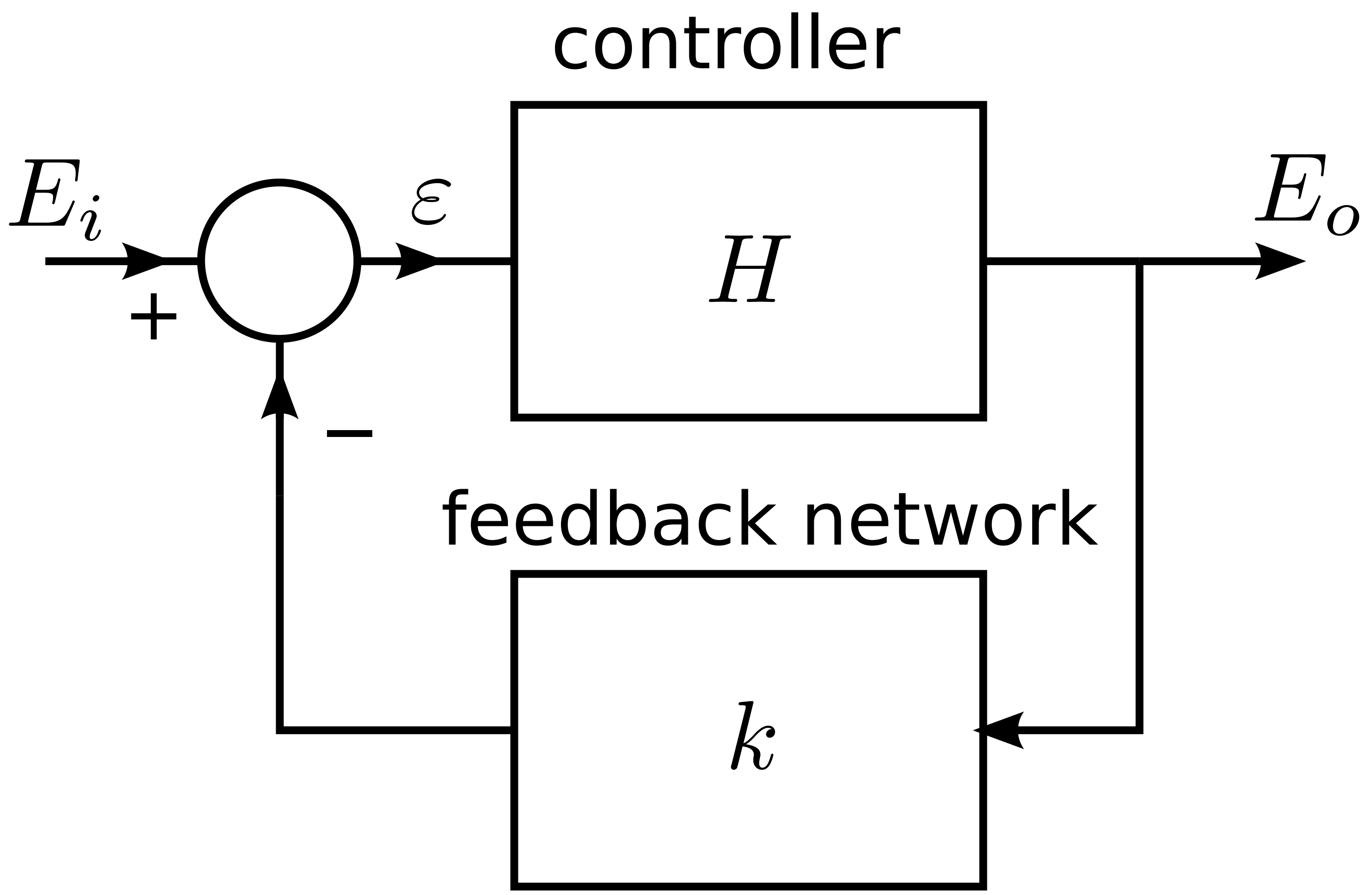

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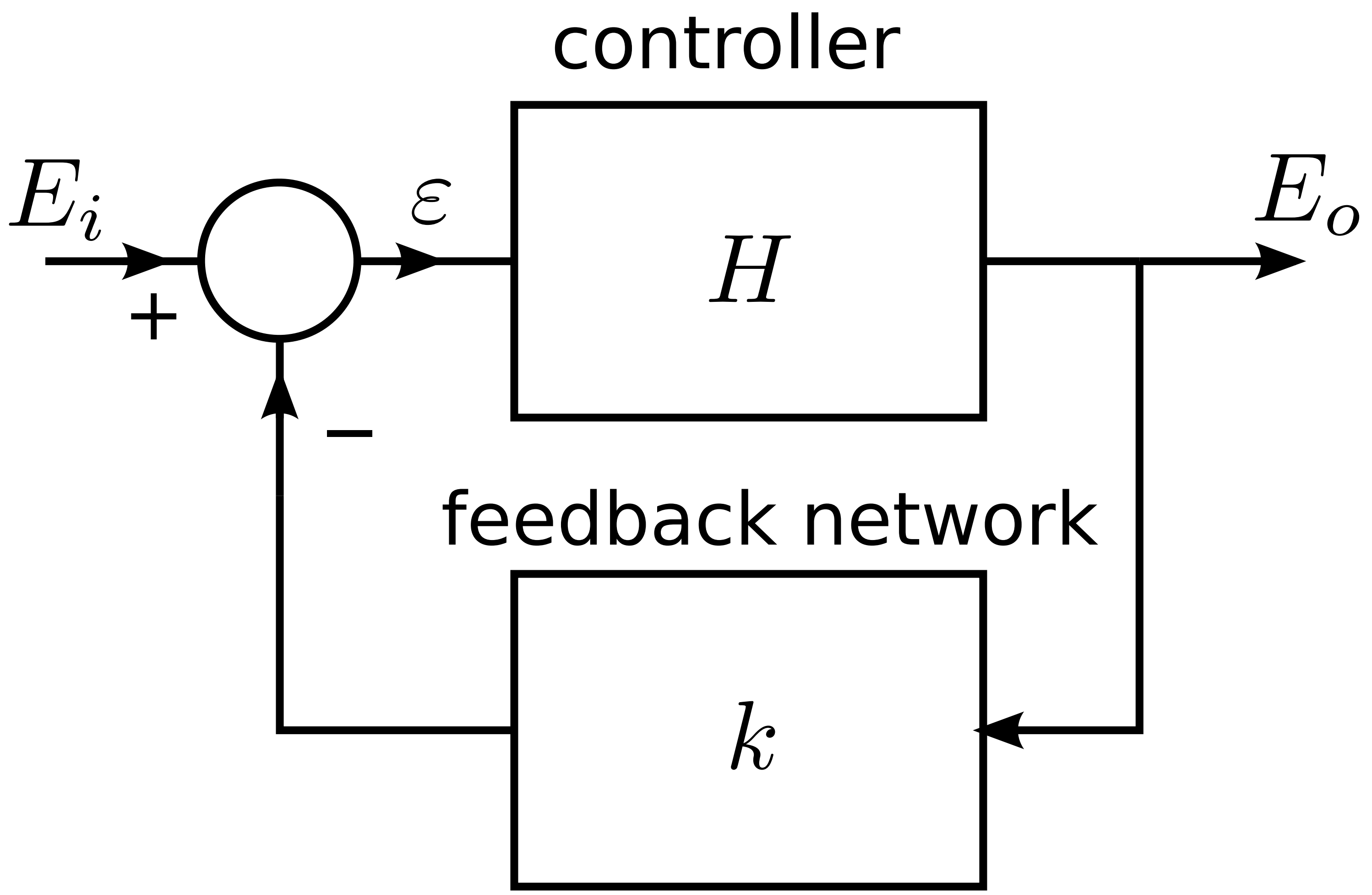

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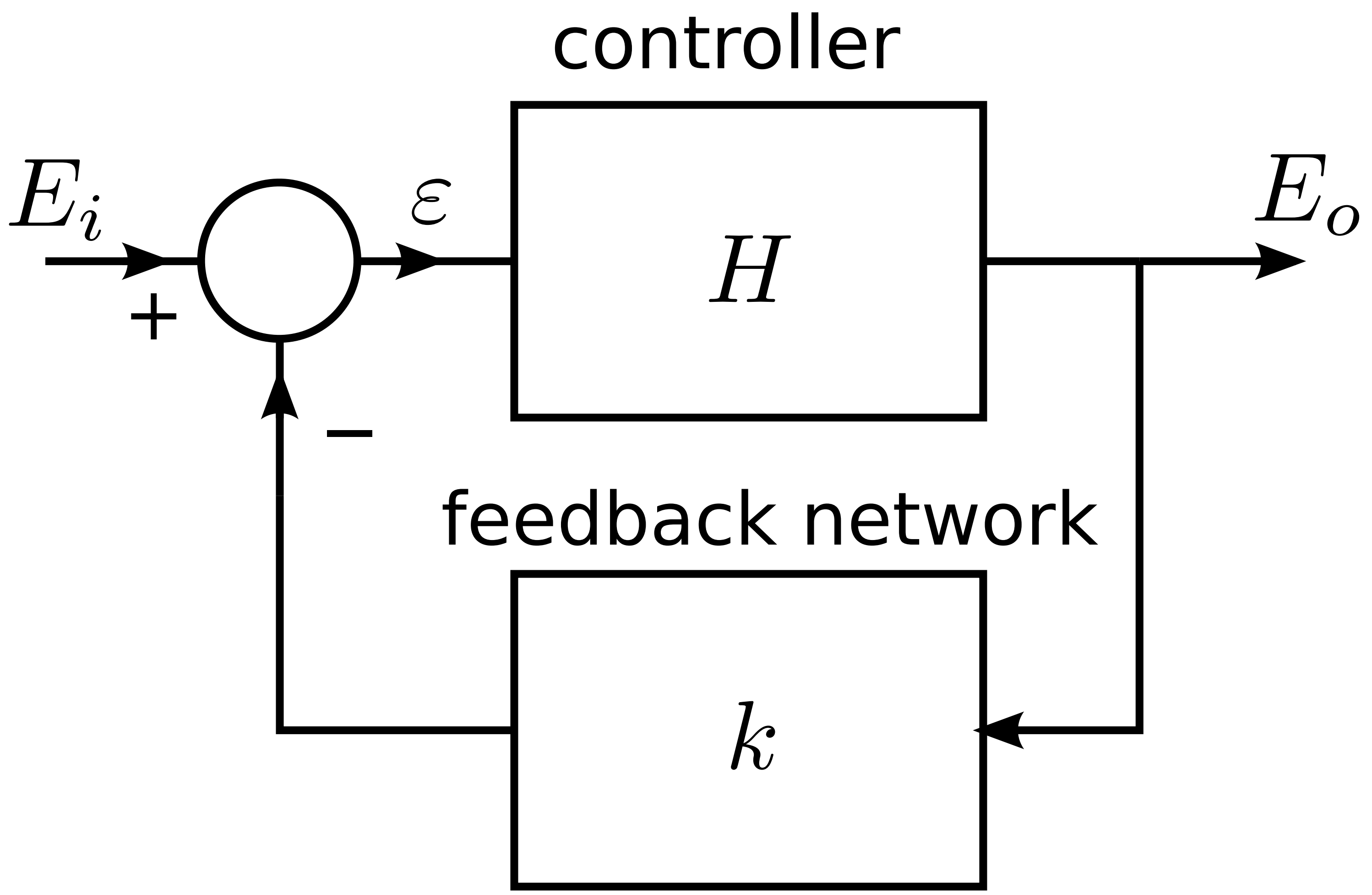

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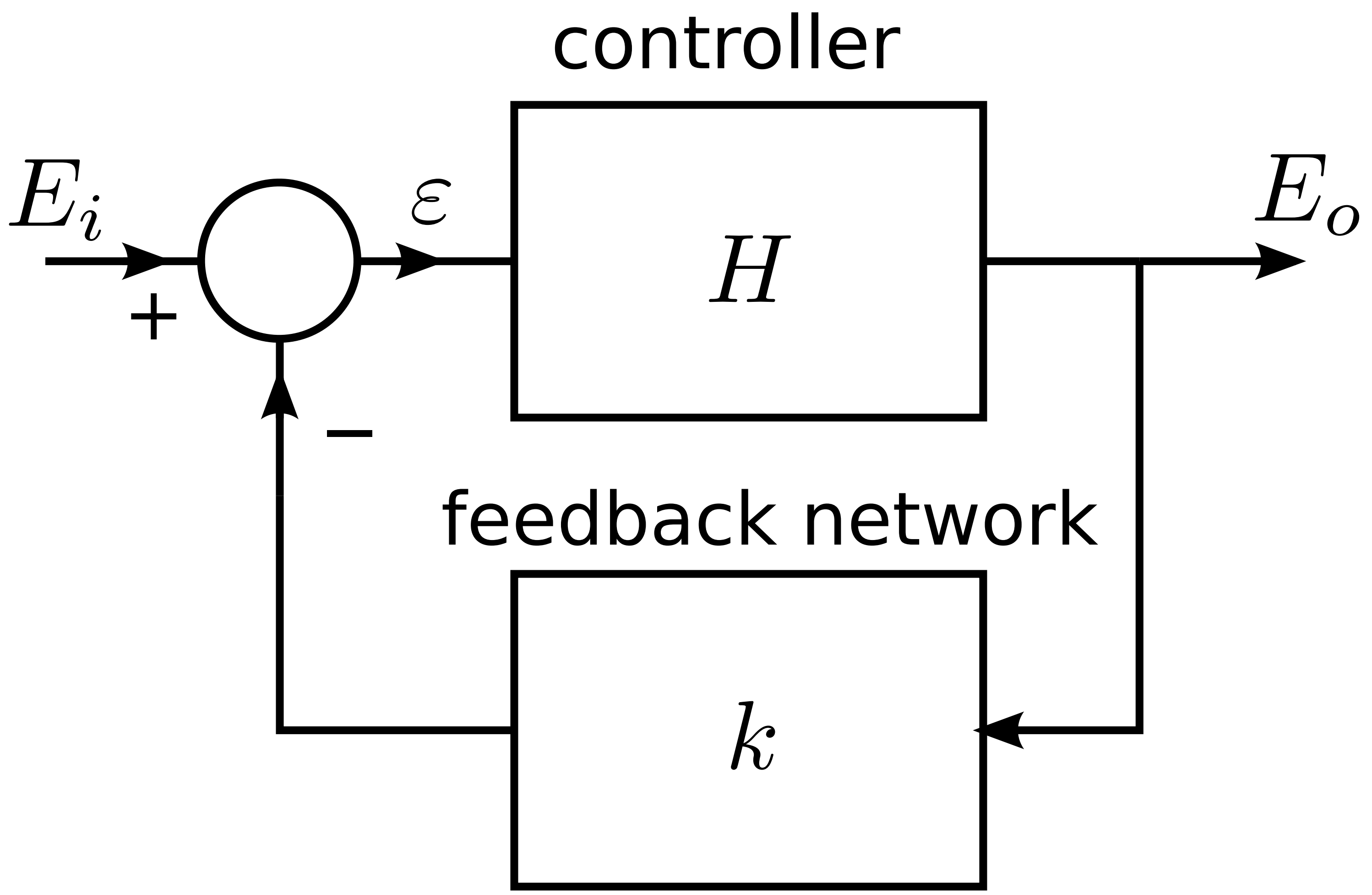

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Input-output transfer, rewritten:

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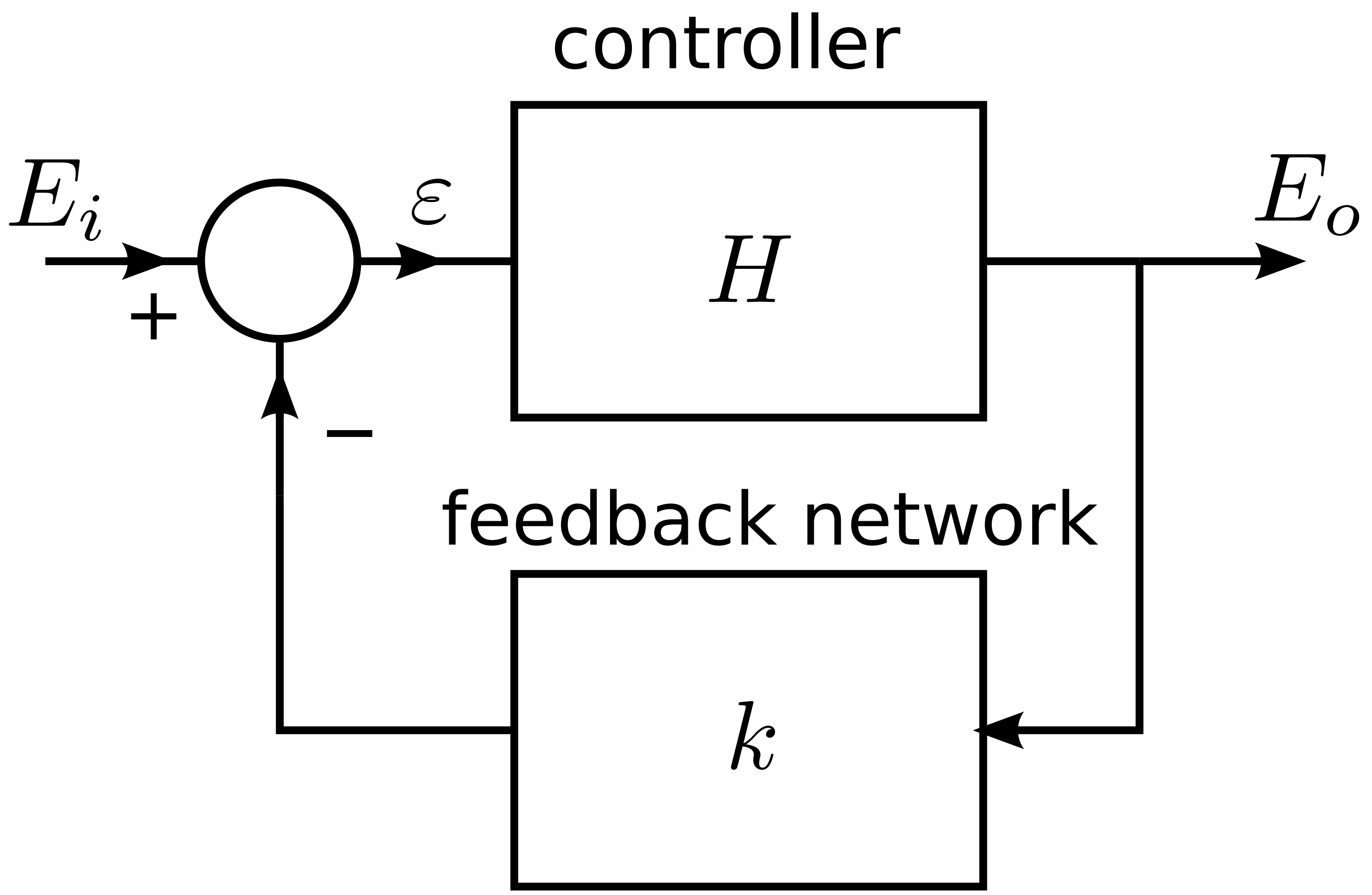

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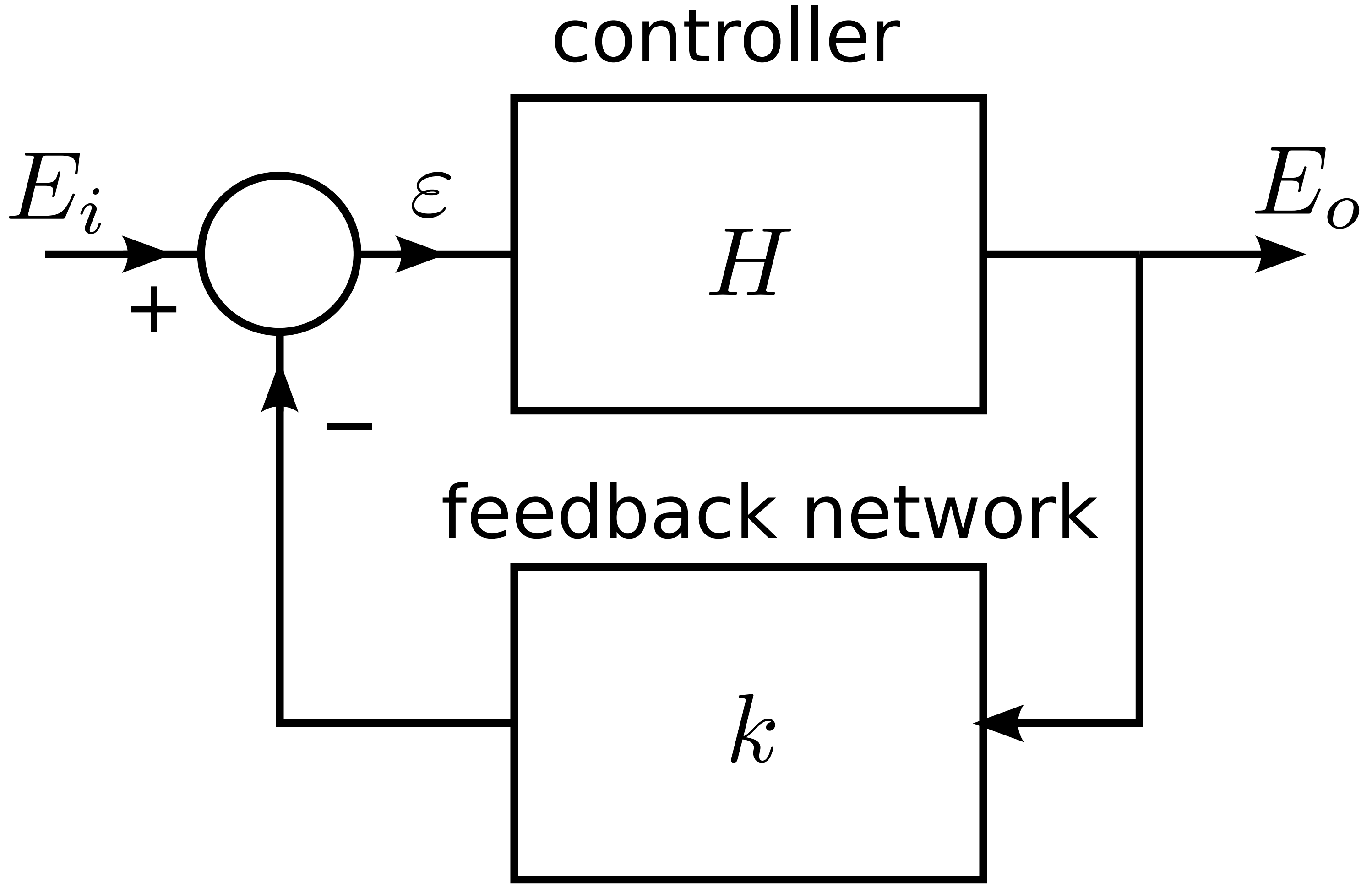

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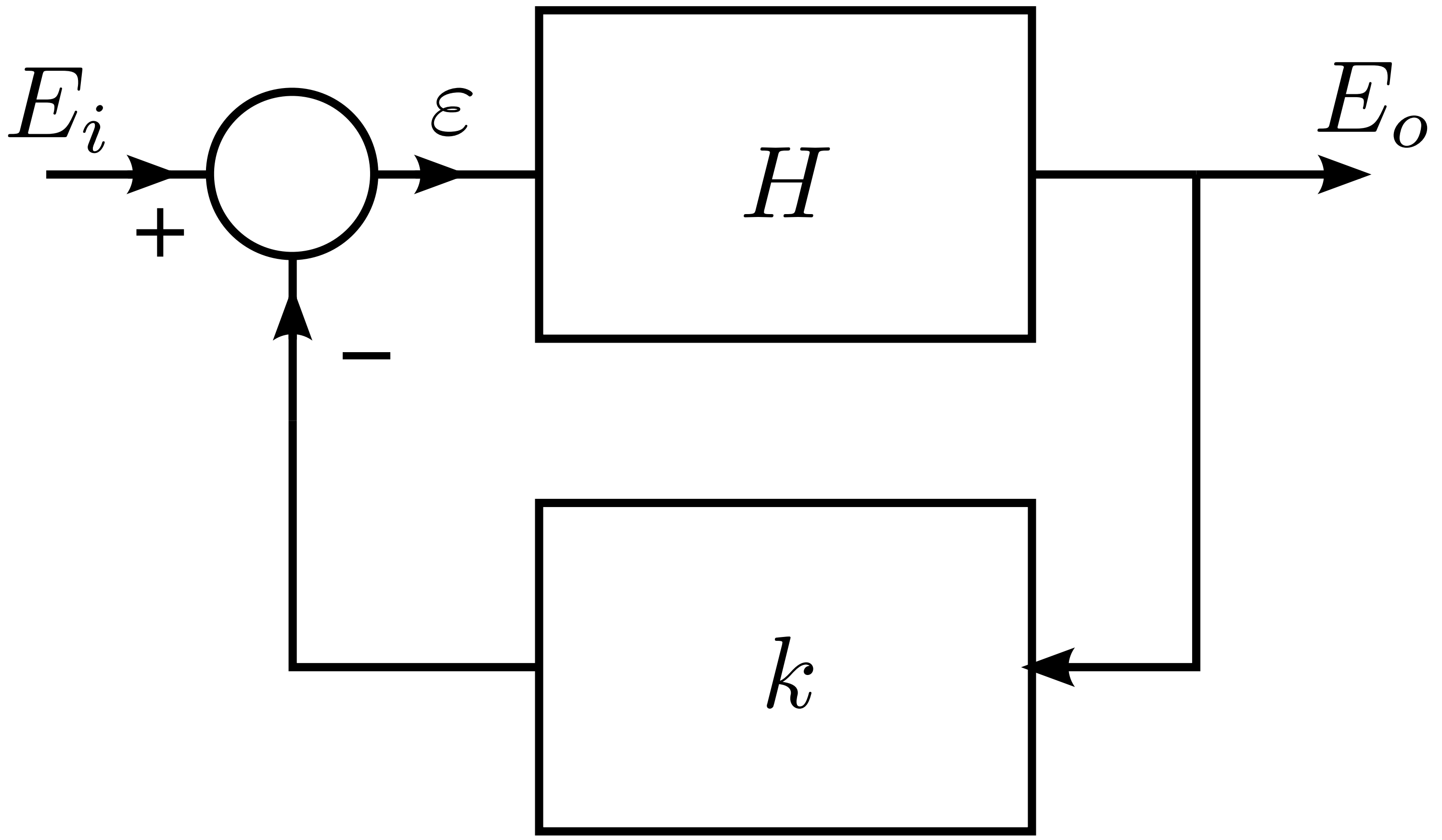

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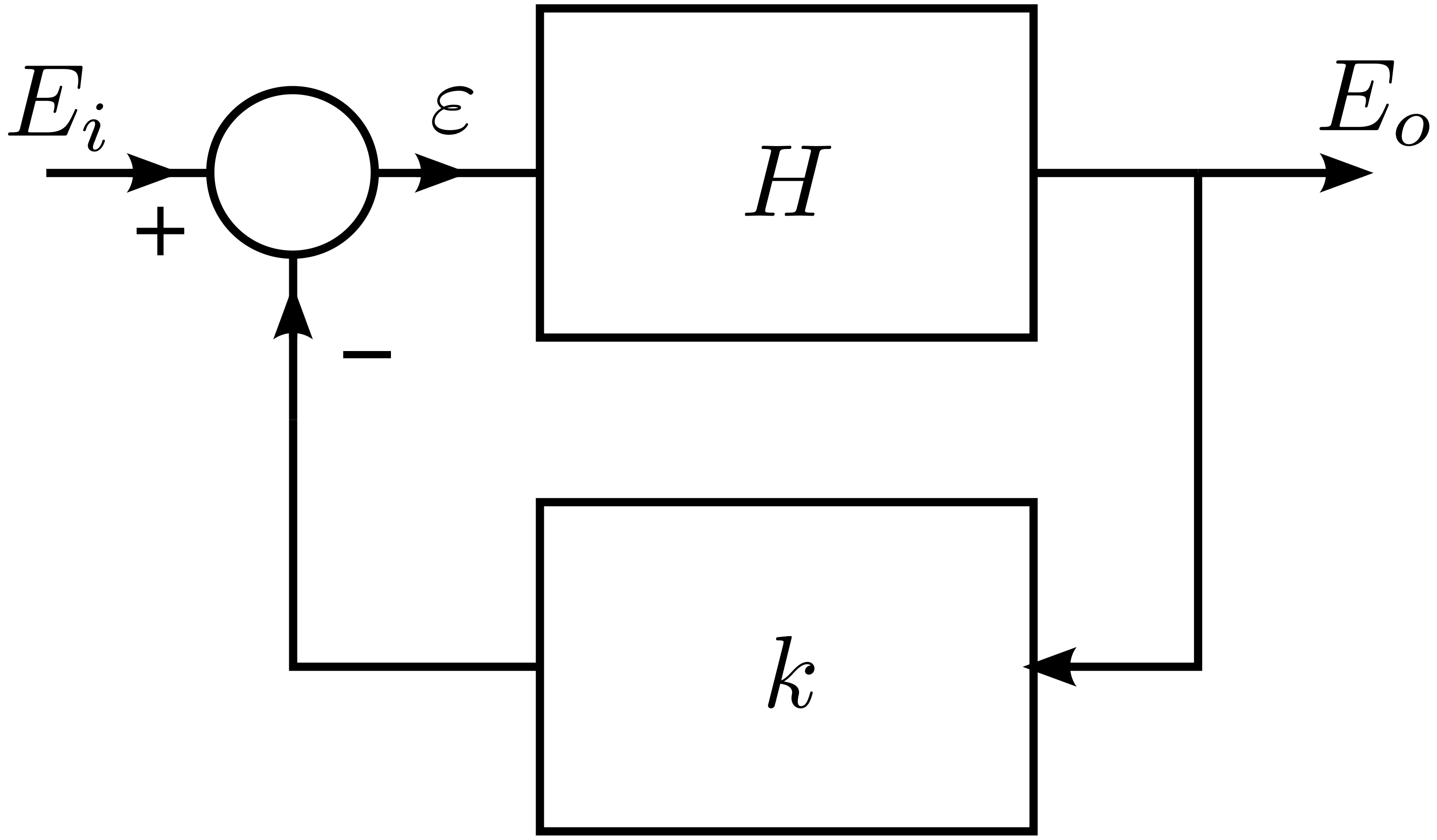

Ideal subtraction requires infinite CMRR,
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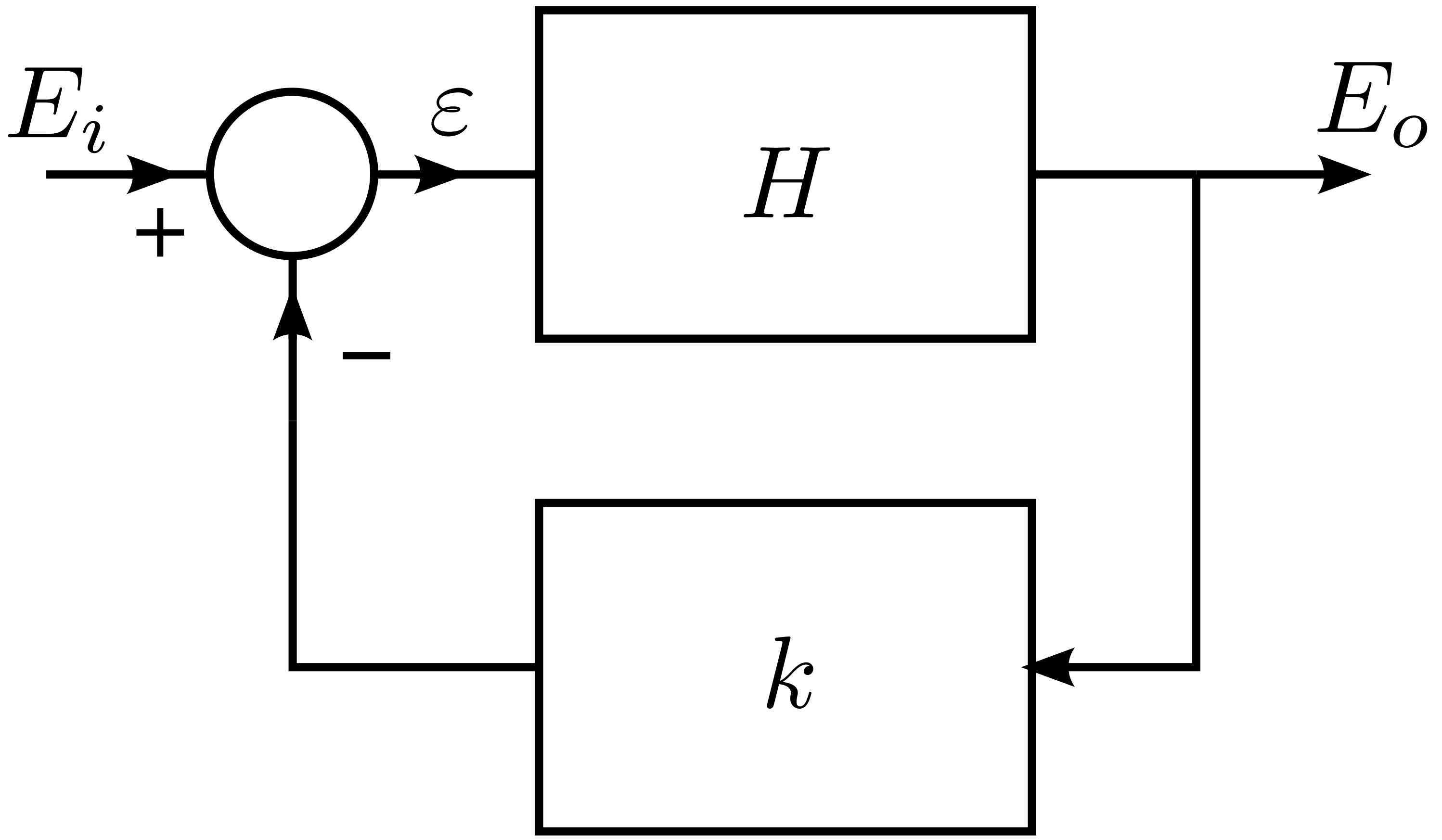
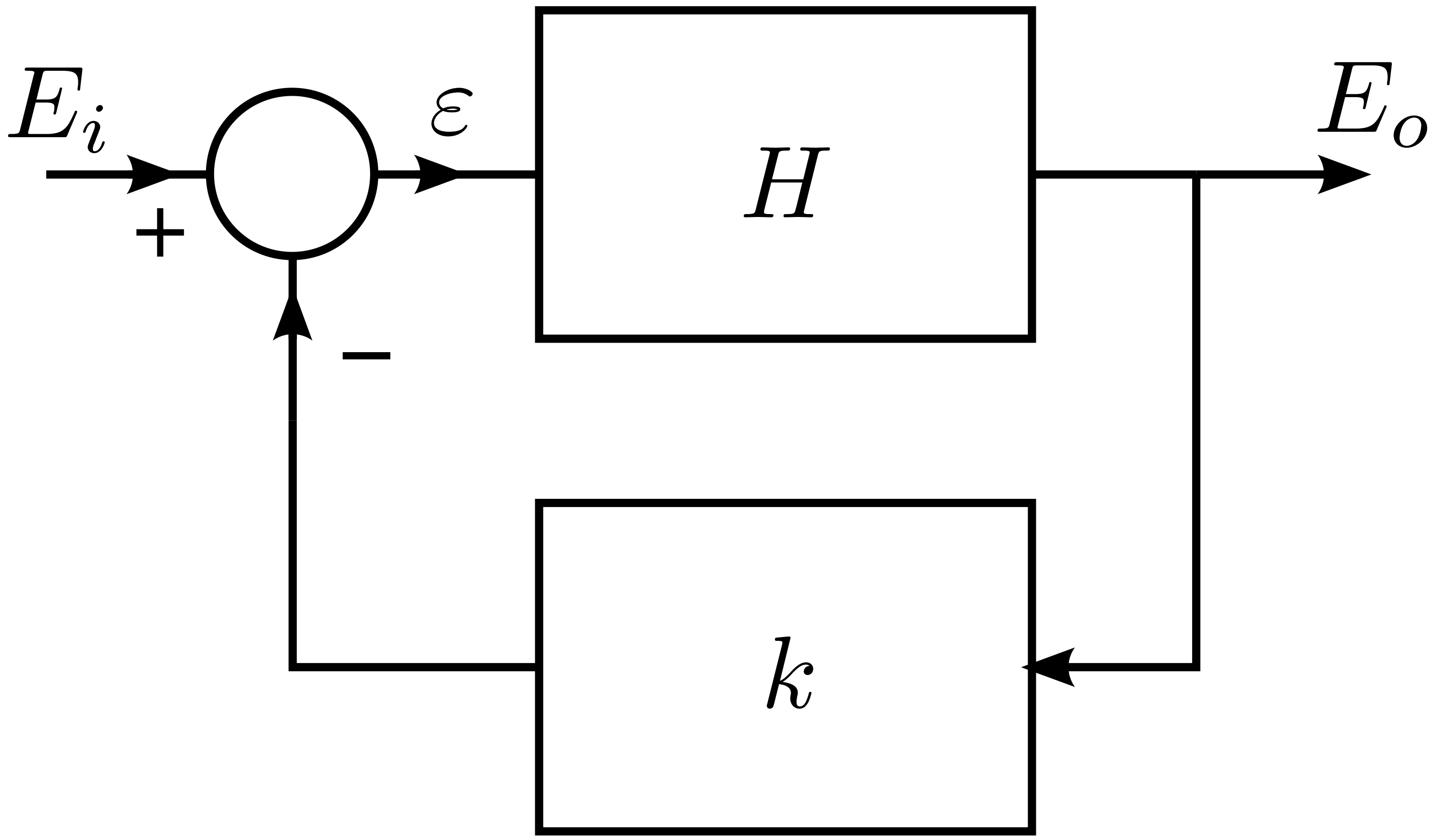
Black's feedback model, assumptions



Ideal subtraction requires infinite CMRR, subtraction result does not depend on:

Source impedance

Black's feedback model, assumptions



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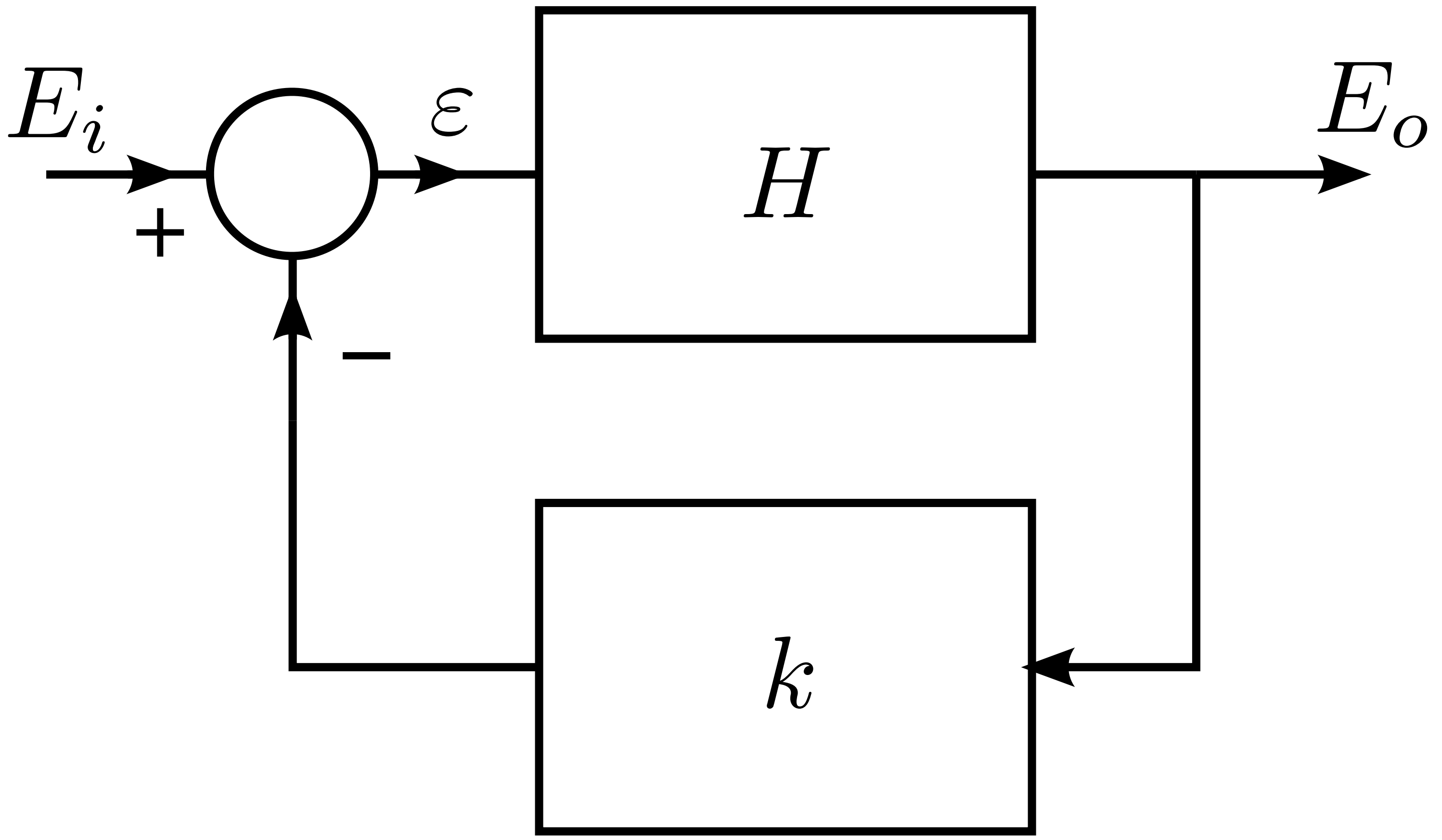

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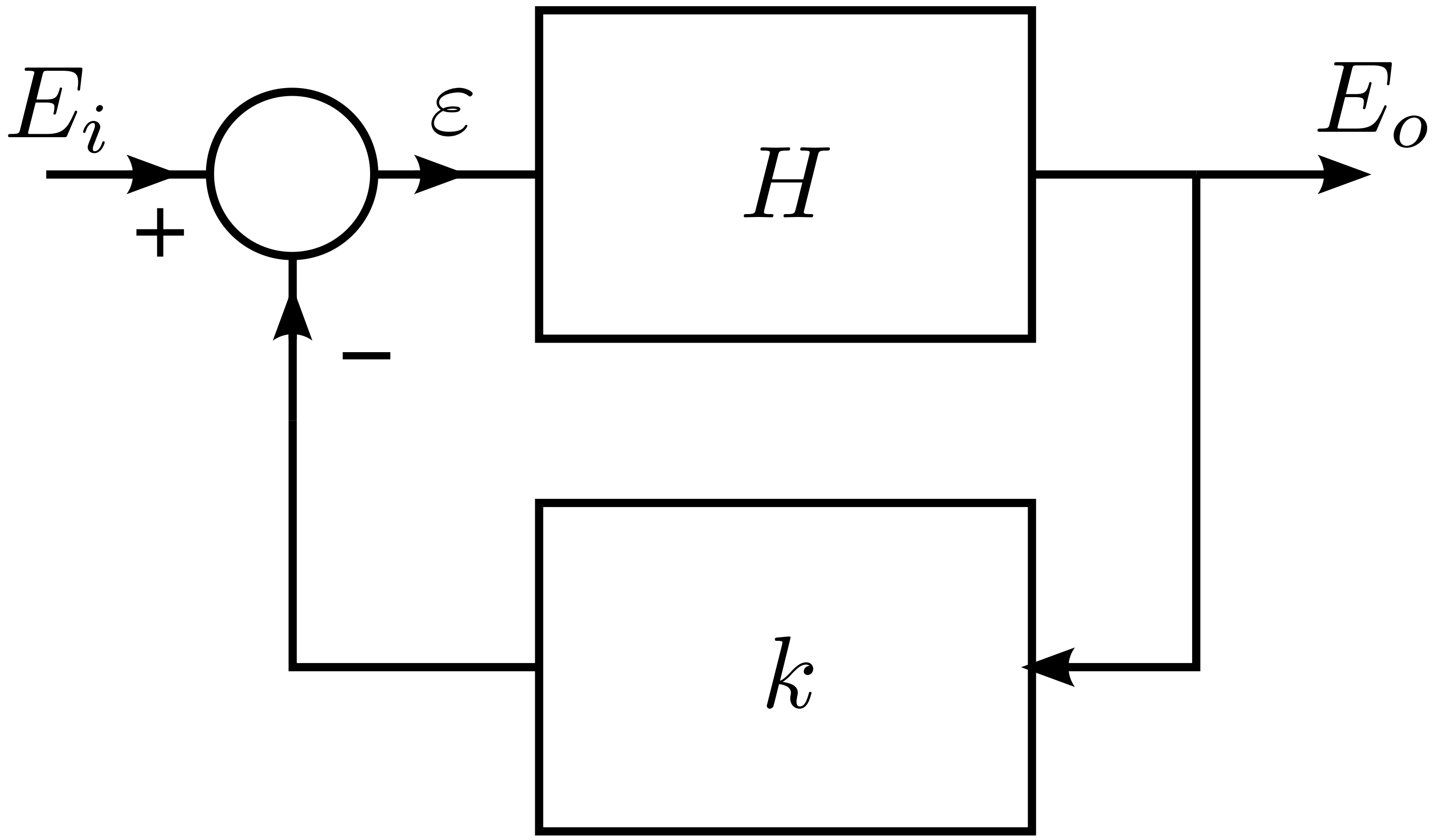

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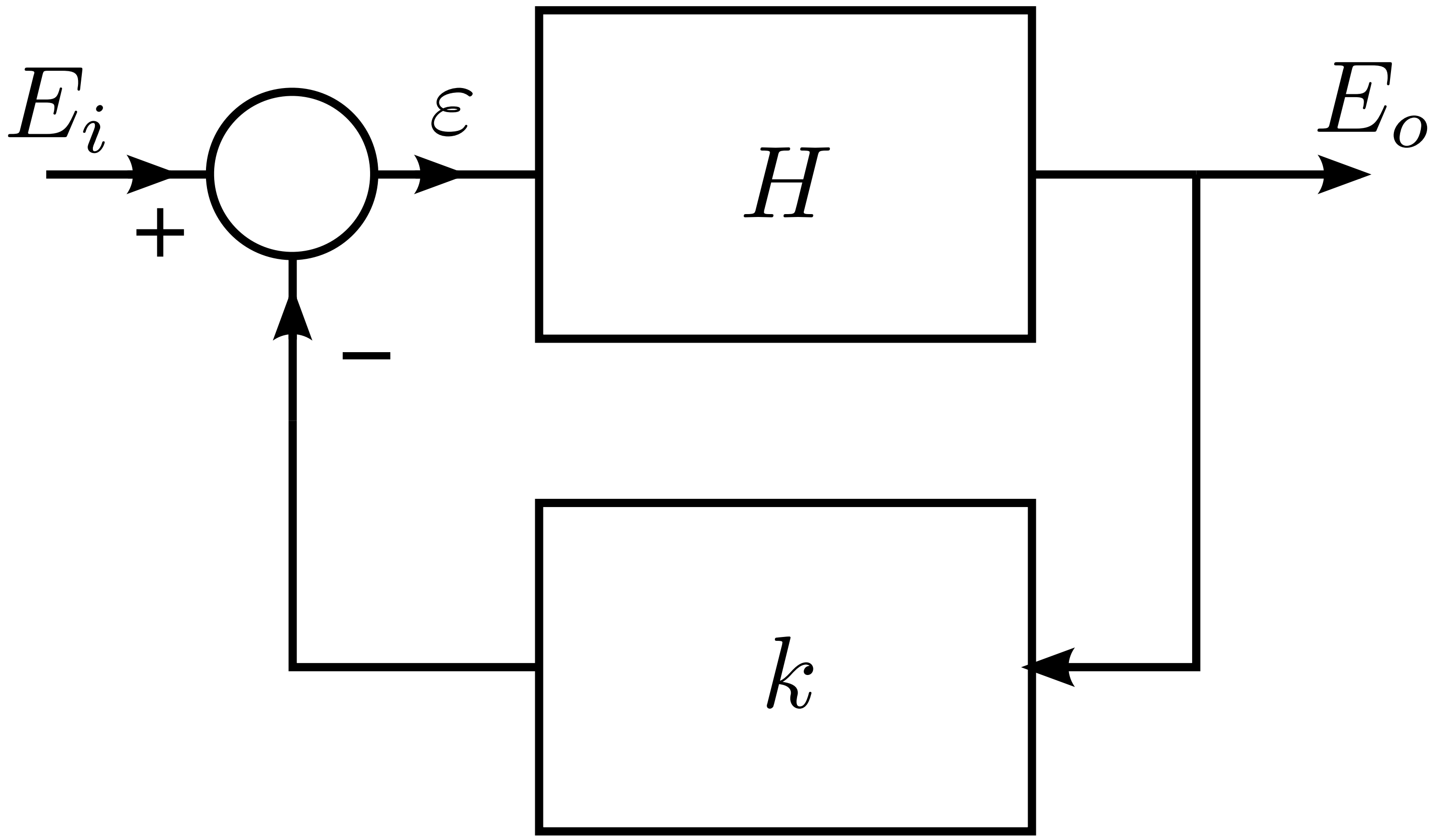

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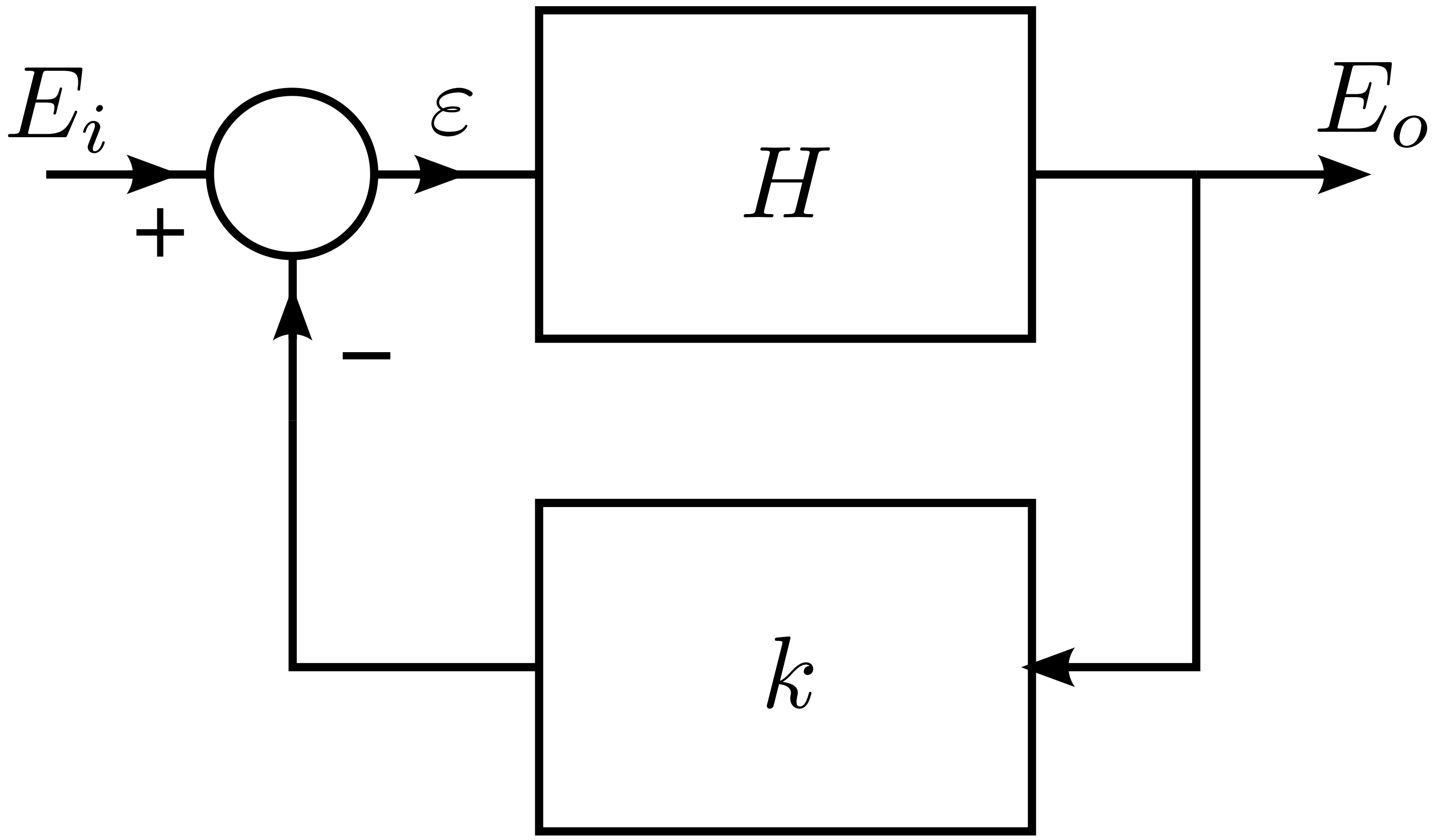

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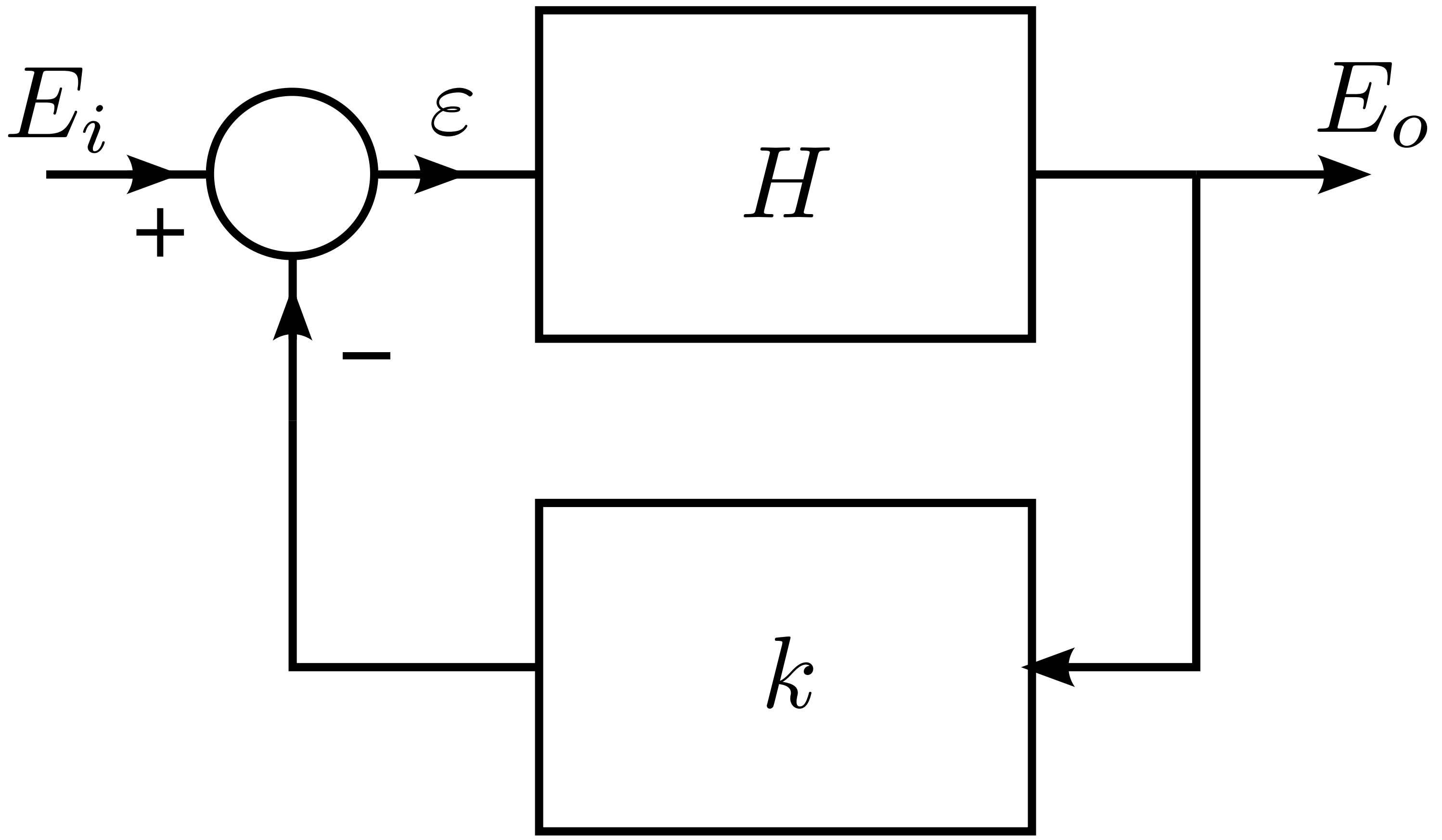

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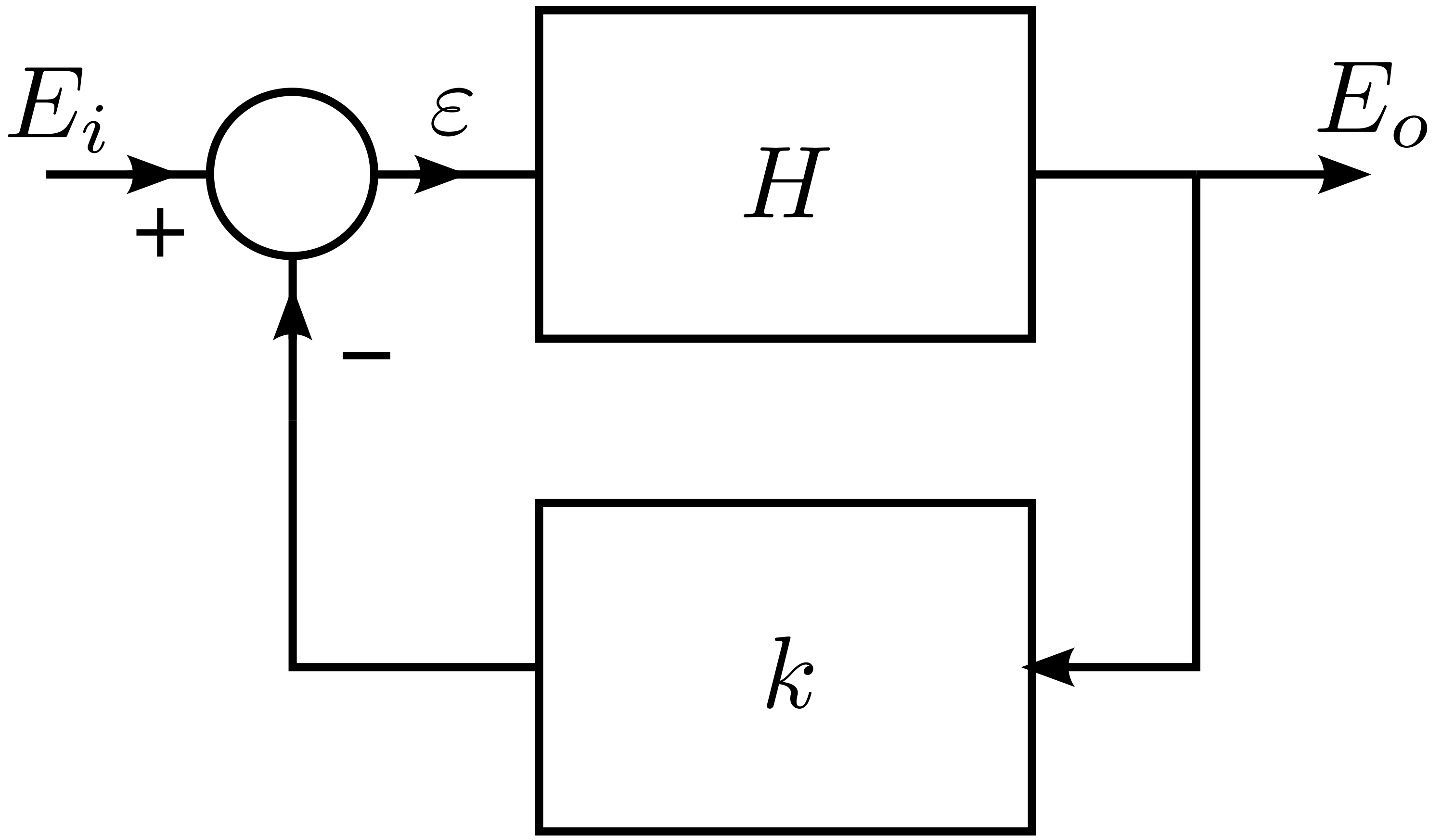

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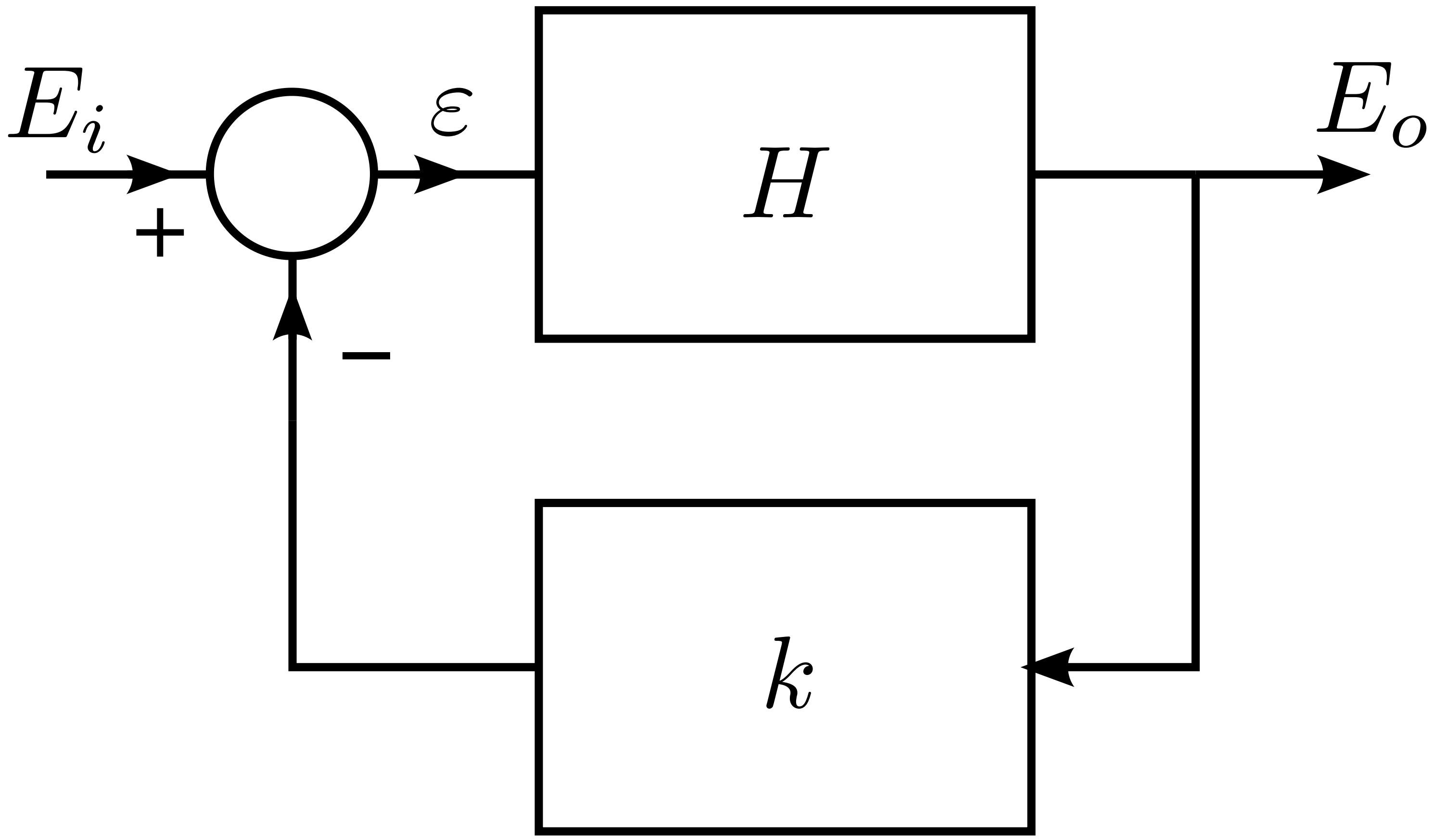

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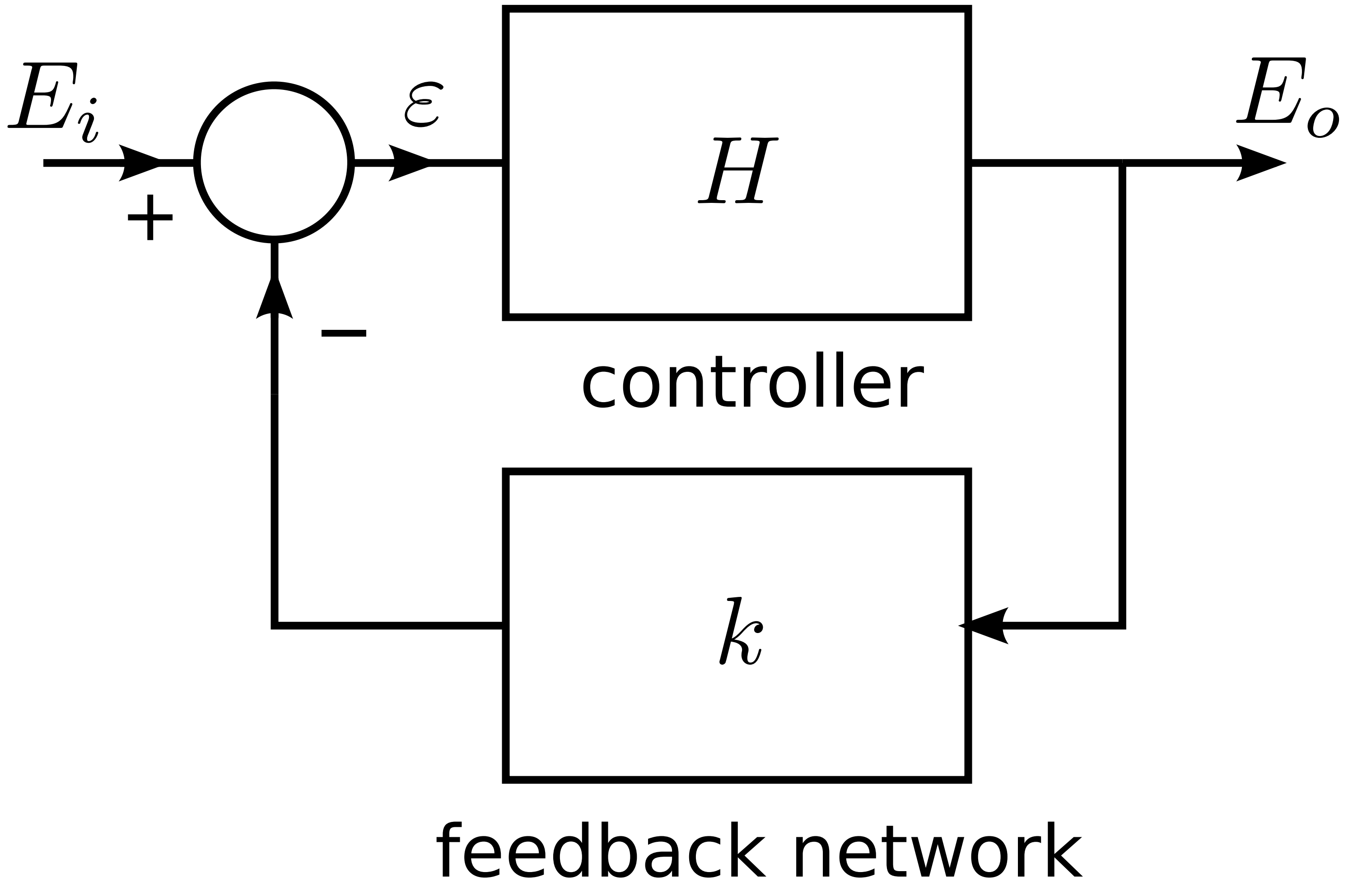

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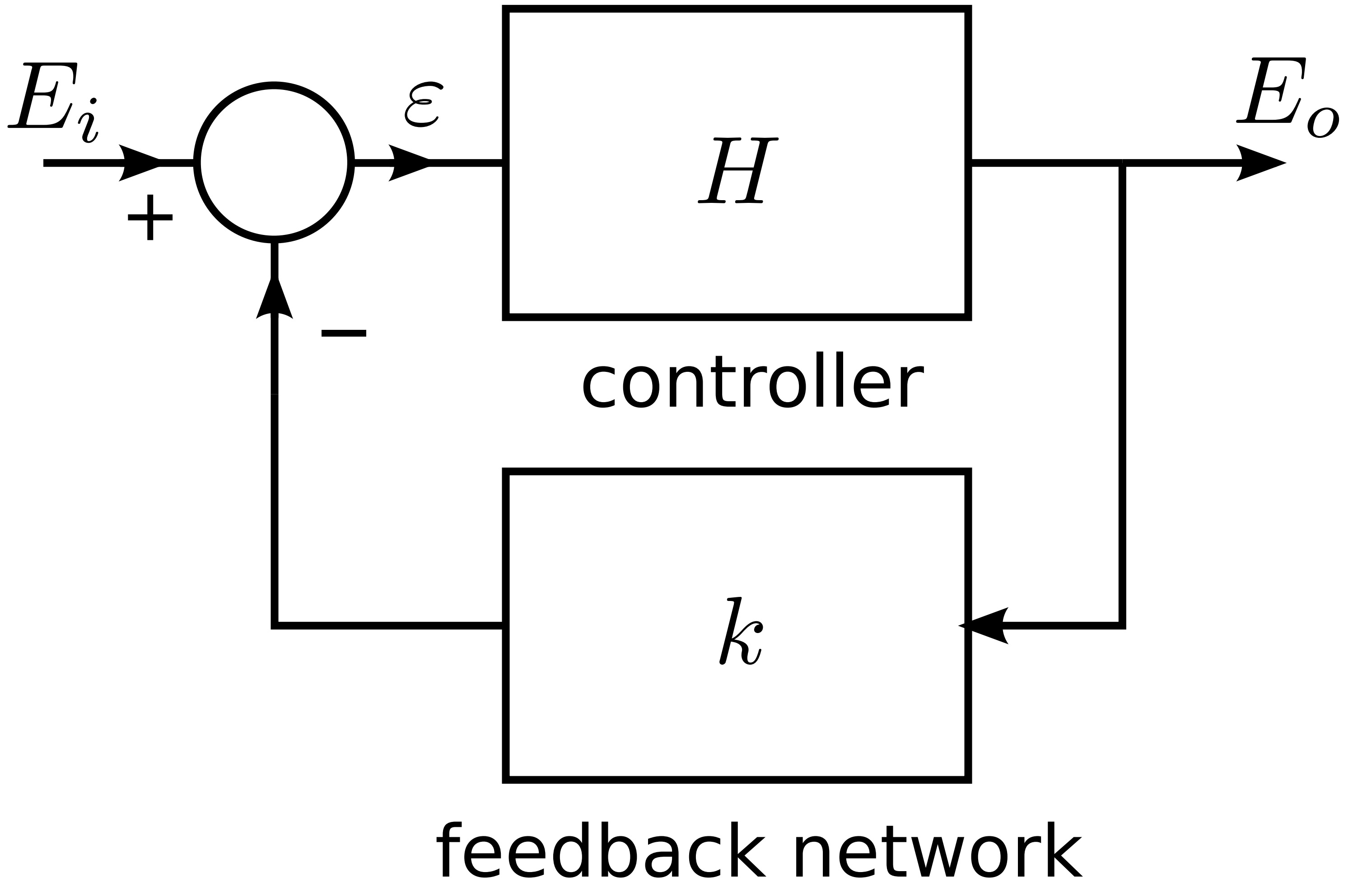

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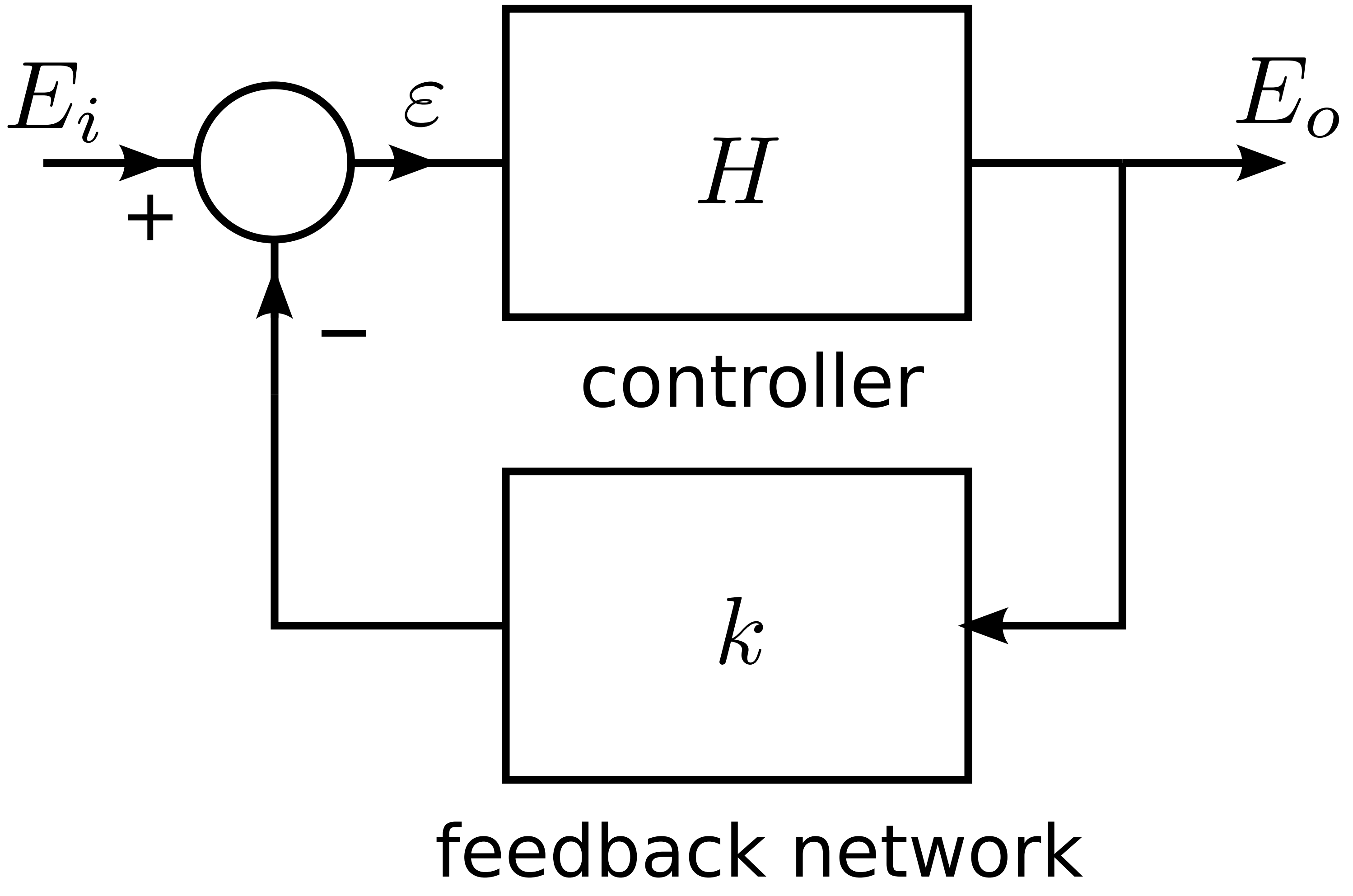

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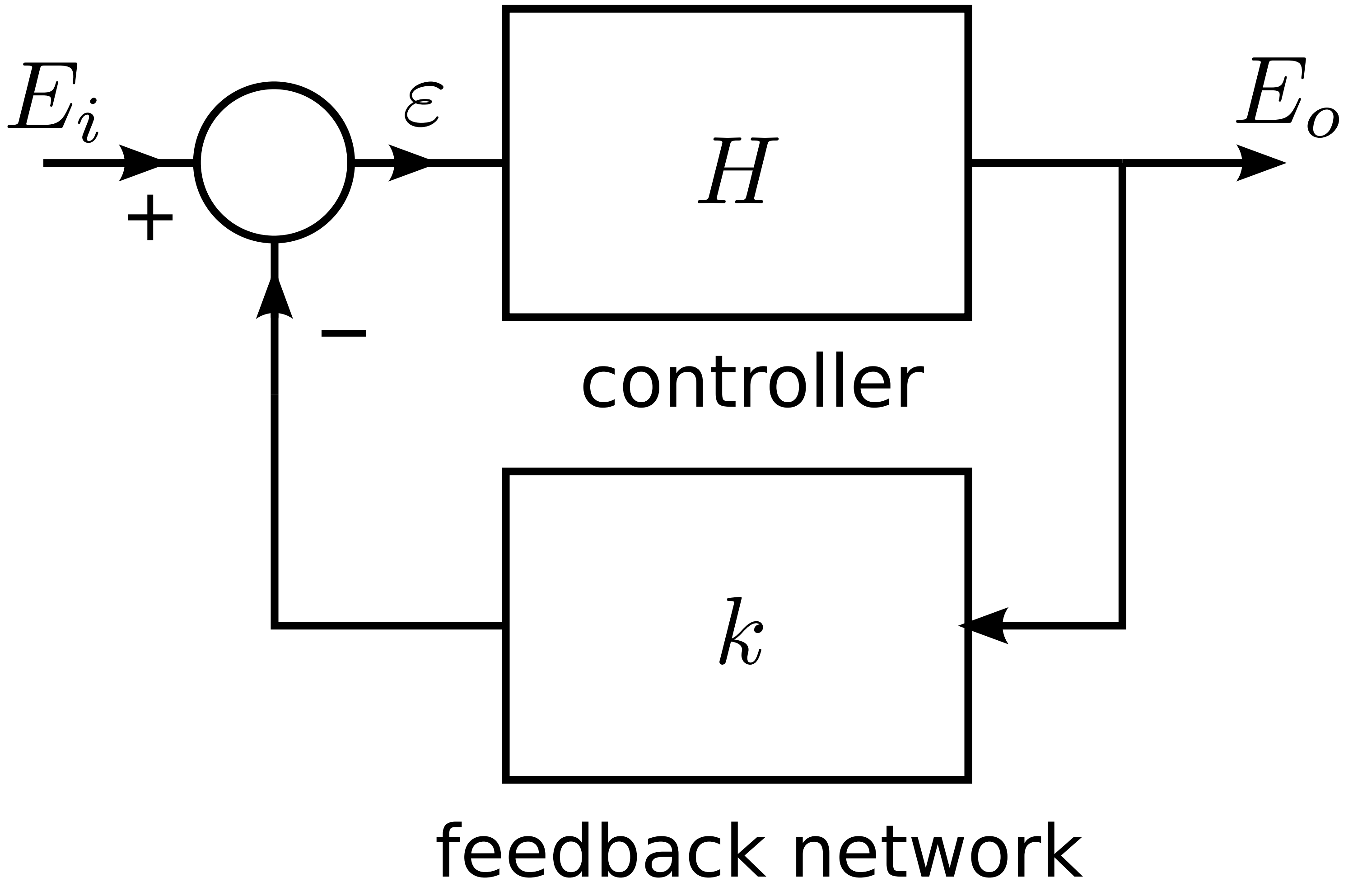

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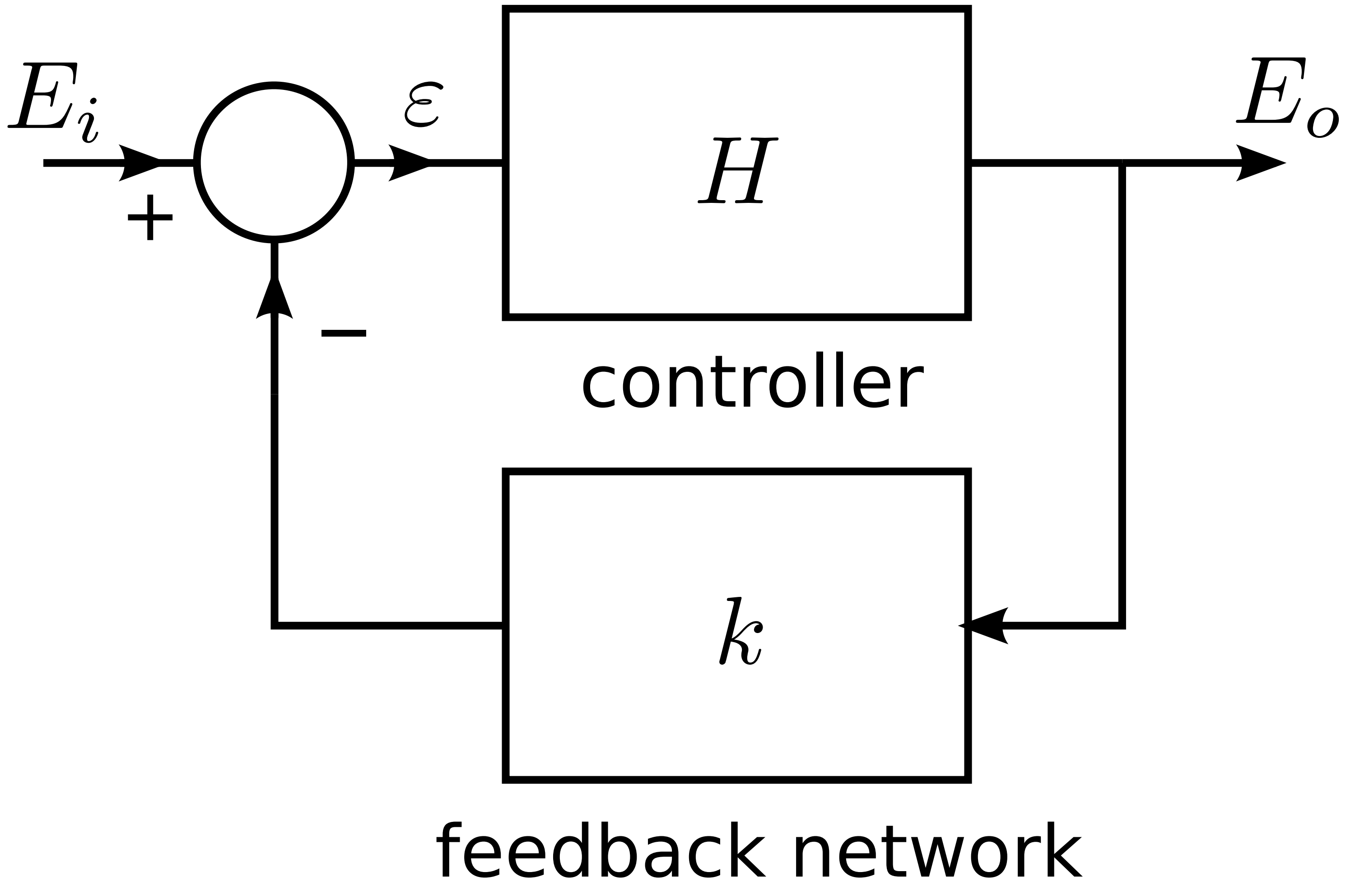

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See example 10.1 and 10.2

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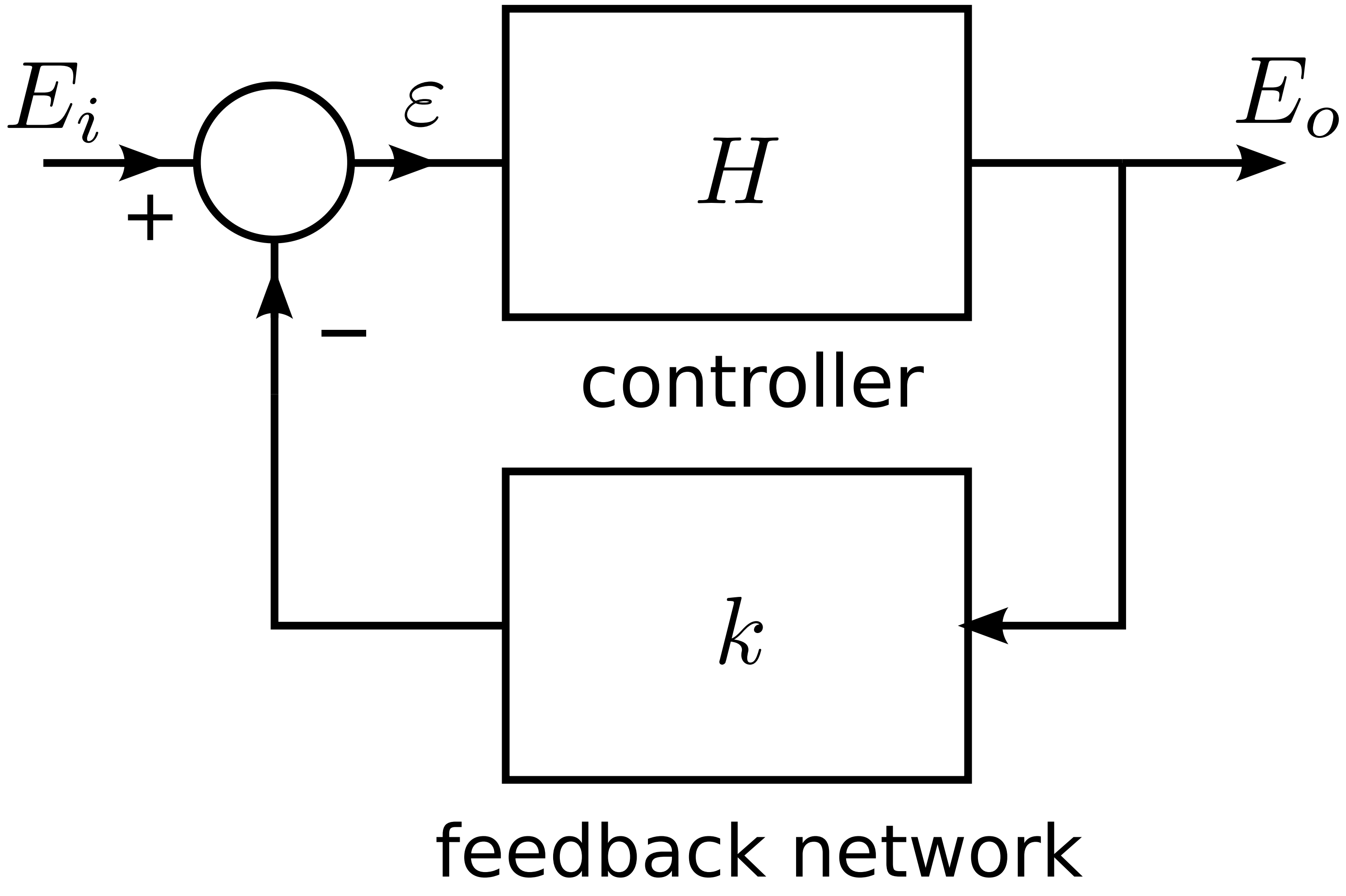

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