Full title

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Functional derivative

The functional derivative $\frac{\partial F}{\partial \mathbf{x}}$ is implicitely defined by the equation

$$dF\left[\mathbf{x}, \tilde{\mathbf{x}}\right] = \int_{\Omega} \tilde{\mathbf{x}} \frac{\partial F}{\partial \mathbf{x}} d\Omega$$

where the functional differential $dF\left[\mathbf{x}, \tilde{\mathbf{x}}\right]$ is defined as

$$dF\left[\mathbf{x}, \tilde{\mathbf{x}}\right] \equiv \left. \frac{d}{d\varepsilon} \right|_{\varepsilon=0} F\left[\mathbf{x} + \varepsilon \tilde{\mathbf{x}}\right]$$