Full title

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Functional derivative

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

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

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

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