Let $(\Omega, \mathcal{A}, P)$ be a probability space, $(\mathbb{R}^l, \mathcal{B}(\mathbb{R}^l))$ a measurable space and $\boldsymbol{\epsilon} : \Omega \to \mathbb{R}^l$ a random noise with $\boldsymbol{\epsilon} \sim \mathrm{p}(\boldsymbol{\epsilon})$ independent of the variational parameter.

Let $g(\cdot\,; \psi) : \mathbb{R}^l \times \mathbb{R}^m \to \mathbb{R}$ be a Borel measurable function s.t.:

$$1)\ g \text{ is a differentiable bijection}$$
$$2)\ g(\boldsymbol{\epsilon}, \mathbf{x}; \psi) = \mathbf{z}$$

where ψ is the variational parameter. The image of g depends also on the values of $\mathbf{x}$ because they are needed to evaluate the reconstruction error.