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Constants of the flow on a smooth manifold

$$\frac{d}{dt}f(\Phi_t(p))\Big|_{t=0} = X_p^\Phi f = \mathcal{L}_X f(p) = d_p f(X)$$

So,

 **Definition.** Constants of the flow on a smooth manifold

$f \in \mathcal{C}^\infty(M)$ is conserved by the flow Φ_t or is a **constant of the flow** if

$$\frac{d}{dt}f(\Phi_t(p))\Big|_{t=0} = 0 = X_p^\Phi f = \mathcal{L}_X f(p) = d_p f(X)$$

constant of the flow sheaf

$$\begin{aligned} \mathrm{CoF}_X : \mathrm{Open}(M)^{op} &\rightarrow \mathbf{Vec}_{\mathbb{R}} \\ \mathrm{CoF}_X(U) &:= \frac{\{f \in \mathcal{C}^\infty(U) : Xf = 0\}}{\mathbb{L}\mathbb{R}(U)} \leq_{\mathbf{Vec}_{\mathbb{R}}} \frac{\mathcal{C}^\infty(U)}{\mathbb{L}\mathbb{R}(U)} \end{aligned}$$

is the quotient okay?

[1]

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1. <https://mathoverflow.net/a/9775> ↩↪