# $\Phi_\ast Z$

August 7, 2017 6:29 PM

$V \sim \{(\eta, \alpha, \xi, \tau)\}$ $\quad Z \sim \exp(\partial_\eta \partial_\xi)$

$\Phi: V \to W$ diffeo, meaning

$\Phi: W^* \to S(V^*)$ linear

or $\tilde{\Phi}: S(W^*) \to S(V^*)$ multiplicative.

or $\tilde{\tilde{\Phi}} \in S(W) \otimes S(V^*)$

The map $\Phi \mapsto \tilde{\tilde{\Phi}}$ is non-linear!

$Z \in \text{Cojets}_0(V)$ meaning $Z \in S(V)$

$$\Phi_* Z = \Big[\overbrace{S(W) \otimes S(V^*)}^{\tilde{\tilde{\Phi}}} \otimes \overbrace{S(V)}^{Z} \xrightarrow{\text{contract } S(V^*)\otimes S(V)} S(W)\Big]$$

In practice, if $\Phi = \begin{pmatrix} \phi_1(\alpha_i) \\ \vdots \\ \phi_n(\alpha_i) \end{pmatrix}$ & $Z = \zeta(\partial_{\alpha_1}, \ldots \partial_{\alpha_n})$

What's $\Phi_* Z$?

Ans. $\zeta(\partial_{\alpha_1} \ldots \partial_{\alpha_n}) \, e^{\sum \phi_i(\vec{\alpha}) \partial_{\beta_i}}\Big|_{\vec{\alpha}=0} =$

$$= e^{\sum \partial_{\beta_i} \phi_i(\vec{\partial_a})} \zeta(a_1 \ldots a_n)\Big|_{a_i=0}$$