Generalized symplectization of Vlasov dynamics

Robert Axel Neiss

Universität zu Köln

rneiss@math.uni-koeln.de

October 30, 2017

Generalized symplectization of Vlasov dynamics

Hamiltonian formalism (symplectization) in finite dimensional systems helps to investigate questions about, e.g., **stability, perturbations, and geometric aspects**.

An example of the formalism has been explicitly found by **Fröhlich, Knowles, and Schwartz**, and it could be generalized for any Vlasov dynamics.

System	phase space	Hamiltonian (energy)	symplectic form	Hamiltonian equation
N ptc	Γ^N	$H(\vec{z})$	J	$\dot{\vec{z}} = \mathrm{J}\nabla H(\vec{z})$
Vlasov limit	$\mathcal{L}^1(\Gamma)$	$\mathcal{H}(f)$	???	$\dot{f} = [H, f]$
Hamiltonian Vlasov	$\mathcal{L}^2(\Gamma)$	$\mathcal{H}_{\mathrm{Vl.}}(\alpha)$	i	$\dot{\alpha} = [H, \alpha] + img.$

where $\mathcal{H}_{\mathrm{Vl.}}(\alpha) = \frac{1}{2}\Im \, \mathrm{D}^1\mathcal{H}\left(|\alpha|^2\right)\left\{[\bar{\alpha}, \alpha]\right\}$.