Collision operator & Ridgelets

Einstein summation convention

$$f^n(x,v) = \sum_i r_i(x)\ \bar{\psi}_i \cdot \Phi(v)$$

$\Phi(v)$: Polar - Laguerre basis vector

$$\int_D \int_{\mathbb{R}^2} Q(f^n, f^n)\ r_{i'}(x)\ \Phi(v)\ dv\,dx$$

$$\boxed{\Phi(v) : \mathbb{R}^2 \to \mathbb{R}^N}$$

$$= \int_D \sum_{i_1, i_2} \underbrace{r_{i_1}(x) r_{i_2}(x) \int_{\mathbb{R}^2} Q\left(\bar{\psi}_{i_1}, \bar{\psi}_{i_2}\right)} \Phi(v)\, dv\ \ r_{i'}(x)\, dx$$

$$= \int_D \underbrace{\sum_{\substack{i_1, i_2 \\ \in \Lambda_q^{v_i}}} r_{i_1}(x) r_{i_2}(x) \int_{\mathbb{R}^2} Q\left(\bar{\psi}_{i_1}, \bar{\psi}_{i_2}\right) \Phi(v)\, dv}_{(*)}\ \ r_{i'}(x)\, dx \qquad \forall i'$$

$\Lambda_q \subset \Lambda$

$\hat{\imath}$ set of active ridgelet coefficients

Project $(*)$ to ridgelet representation.

$\bar{\psi}^q$: coefficients after collision

$$(*) \approx \sum_j r_j(x)\ \bar{\psi}_j^q \cdot \Phi(v)$$

how is it done?