

Procedure

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Outline

Part 1. Spectral Analysis

- ▶ take fft azimuthally
 - ▶ use half of θ data to avoid aliasing
- ▶ find correlation in t, t' described in Smits2017.below.eq.2.4.

$$\mathbf{R}(k; m; t, t') = \int_r \mathbf{u}(k; m; r, t) \mathbf{u}^*(k; m; r, t') r \, dr \quad (1)$$

- ▶ take fft in x of the above correlation to get k modes.

Part 2. Snapshot POD

- ▶ the crossspectra for the kernel of the pod

$$\lim_{\tau \rightarrow \infty} \frac{1}{\tau} \int_0^\tau \mathbf{R}(k; m; t, t') \alpha^{(n)}(k; m; t') dt' = \lambda^{(n)}(k; m) \alpha^{(n)}(k; m; t)$$

- ▶ Find the (sorted) eigenvalues $\alpha^{(n)}$ found in (2) to solve for $\Phi^{(n)}$,

$$\lim_{\tau \rightarrow \infty} \frac{1}{\tau} \int_0^\tau \mathbf{u}_T(k; m; r, t) \alpha^{(n)*}(k; m; t) dt = \Phi_T^{(n)}(k; m; r) \lambda^{(n)}(k; m)$$