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A Method of Synthesizing 1-D POD Modes for Channel Flow¹ JON BALTZER, RONALD ADRIAN, Arizona State University — POD analysis is performed on DNS channel data for several Reynolds numbers between $Re_{\tau} = 180$ and 950. The one-dimensional eigenmodes in the wall-normal direction are oscillatory and their phases can be extracted by various means. The phases contain the physics implied by the two-point spatial correlation, and the phases scaled using sequency correlate well with a single curve for all but the lowest mode numbers. An orthogonal basis to approximate the POD modes has been developed using this single phase function. Convergence using this basis is comparable to POD and superior to conventional orthogonal polynomials. The phase function is also compared to asymptotic results for large mode number (Moser, Phys. Fluids, 6, 794-801, 1994).

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