



SIGNALS AND SYSTEMS



Polar Form of Fourier Series



- Provides a powerful and intuitive representation of periodic signals.
- Utilizes the amplitude and phase information of each harmonic component, effectively capturing the signal's frequency content and its temporal behavior.



- Polar form - complex exponential representation of sinusoidal signals.
- Expresses a sinusoid as a complex exponential function, includes both frequency and phase information.
- Euler's Formula
- Frequency and Phase



Derivation of the Polar Form



- Expressing the Fourier coefficients in polar coordinates.
- Separate the amplitude and phase components of each harmonic
- Provides a more insightful understanding of the signal's spectral content.



Interpretation of Amplitude and Phase



- The amplitude of each harmonic represents its strength of the harmonic component or contribution to the overall signal.
- The phase shift indicates the temporal alignment of the harmonic relative to the fundamental frequency.



Applications of the Polar Form



- Signal Analysis
- Filter Design
- System Identification



Advantages of the Polar Form

- Simplified Representation
- Intuitive Interpretation
- Ease of Manipulation

Limitations of the Polar Form

- Computational Complexity
- Round-off Errors



Thank
you

