This thesis presents a real-time simulation system for ocean waves using Tessendorf's frequency-domain approach implemented via the Fast Fourier Transform (FFT) on the GPU. Unlike traditional methods and implementations limited to single-spectrum models or small viewing areas, this work supports modular wave spectra, including Phillips and TMA models, as well as directional spreading functions. The implementation emphasizes both visual realism and performance, achieving interactive frame rates across various resolutions. A real-time texture synthesis technique is integrated based on stochastic tiling with spectral variance preservation to mitigate the visible periodicity common in FFT-generated tiles. The system features interactive controls for simulation parameters, spectrum visualization, and foam generation, providing an extensible framework for virtual environments and games.