Energy Control of ASML EUV Source

Max Crisafulli | Craig Weiner | Sean Tseng | Bryan Chung | Armura Tang

Twice the Speed, Twice the Power

ASML's Extreme UltraViolet (EUV) photolithography process is essential for the production of almost all modern-day chips in high-tech devices. Photolithography is a key process in chip fabrication; circuit features are produced by exposing a photosensitive material deposited on the chip to high-energy EUV light. ASML's machine requires high-speed and high-tolerance control over the EUV light produced. ASML intends to increase the speed of these machines; however, sensor delays inherent to the system mean that increasing the speed degrades the quality of the EUV light received by the wafer.

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Our project minimizes the effect of the feedback delay by implementing a Kalman-Filter based prediction algorithm and PID controller. The controller and predictor were tuned by developing metrics to evaluate the simulated system's performance. The main metric by which the system's performance was evaluated is called dose error: a measure of the difference between the wafer's desired EUV light exposure versus how much light it actually received.

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