

## **Adaptive Optics Deformable Mirror Electronics Simulation**

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The Subaru Telescope is developing a second generation, higher order, adaptive optics system. Adaptive optics (AO) increases image resolution by compensating for atmospheric turbulence with corrections using a wavefront sensor, control computer, and deformable mirror. The shape of the deformable mirror, and thus the correction to the aberrated wavefront, is produced by the reaction of the actuators of the mirror to the stimulus being supplied by the high voltage boards. The goal of the project was to determine a suitable way of protecting the deformable mirror from damage due to rapid changes in the drive voltages. A pSpice model of the electronics controlling the deformable mirror was created to accurately simulate the time and frequency response. Simulating operation of the high voltage amplifiers in the non-linear mode of current limiting indicated the circuit would become unstable and fail to current limit possibly causing oscillation. Limiting drive voltages using digital signal processing techniques was another method of slew rate limiting investigated using the Spice simulation. The simulation was a valuable test bed incorporated into the overall model of the components of the AO system.