



DESIGN OF AUTO-FOCUSING MODULES IN CELL PHONE CAMERAS

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Abstract- Endowed with Hall-effect sensors and voice coil motors, cell phone cameras as intelligent systems are capable to execute auto-focusing for acquiring sharp image. For the use of cell phone cameras, this study presents an innovative auto-focusing module. When coils are powered, induced magnetic fields generate N and S poles around iron cores in the actuator. Unlike voice coil motors that employ Lorentz force, the motion of the moving part in this study is arisen from a magnetic pole property - same poles repel each other while opposite poles attract each other. Using a three-dimensional finite element method, we calculate electromagnetic and mechanical characteristics including current variation of coils, displacement and velocity of the moving part, and actuation force. Simulation results show that the proposed auto-focusing module achieves rapid response and low power consumption.

Index terms: Auto-focusing, cell phone camera, magnetic circuit analysis, finite element method.