Influence of a Parallel Magnetic Field on Microwave-Induced Oscillatory and Zero-Resistance States C.L. YANG, Z.Q. YUAN, R.R. DU, Dept. of Physics, University of Utah; Dept. of Physics and Astronomy, Rice University, L.N. PFEIFFER, K.W. WEST, Bell Laboratories, Lucent Technologies — We have studied experimentally the influence of a parallel magnetic field on microwave-induced resistance oscillations and the subsequent zero-resistance states (ZRS) previously discovered in a high-quality two-dimensional electron gas. Our experiments were performed in a frequency range from 25 to 150 GHz and at temperatures from 0.5 to 8 K; samples were Hall bars of GaAs/Al$_x$Ga$_{1-x}$As heterojunctions and quantum wells having low temperature mobility as high as $2 \times 10^7$ cm$^2$/Vs. A two-axis superconducting magnet was employed to facilitate the experiment. We have observed pronounced suppression of oscillations/ZRS by a parallel magnetic field ($B_{||}$). In contrast, resistance peaks associated with magnetoplasmon resonance become stronger in $B_{||}$. We discuss possible explanations for the observations.