Inferring the Solar Magnetic Field from the Stokes Profiles of the Mg I 12.32-micron Emission Line: Seares' approximation and Non-LTE inversion

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Due to its large Zeeman sensitivity, the Mg I line at 12.32 micron is an important diagnostic tool for solar magnetism. Therefore, the development of a rapid and effective inversion strategy from Stokes observations is essential. To accomplish this, we first synthesized the Stokes profiles from the FAL-C model atmosphere under different magnetic field geometries. Then, we inferred the magnetic field vectors based on the Seares approximation. Furthermore, we utilized the inferred magnetic field parameters from the Seares approximation as initial estimates for a non-LTE inversion procedure. We examined the fits and inversions for various combinations of Stokes parameters, namely (I), (I, V), and (I, Q, U, V). The comparisons between the inferred field and the model field confirm the effectiveness of the inversion strategy. Finally, we applied this inversion strategy to full-Stokes spectro-polarimetric observations made by the Infrared System for the Accurate Measurement of Solar Magnetic Field (AIMS).