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A Niching Genetic Algorithm For Milne-Eddington Spectral Line Inversions BRIAN HARKER, Utah State University / National Solar Observatory, K. BALASUBRAMANIAM, National Solar Observatory, JAN SOJKA, Utah State University — Stokes profile inversions form a basis for "measuring" solar magnetic fields. The High Altitude Observatory (HAO) Milne-Eddington (M-E) spectral line inversions have traditionally been used as initializations to more sophisticated inversion procedures. One such code uses a genetic-algorithm initialization to search the parameter space on a more global scale, in an effort to obtain a good starting guess for a more traditional hill-climbing (e.g. Levenberg-Marquardt) algorithm. A serious drawback to the type of genetic algorithm used is that it has been shown to perform poorly on high-dimensional spaces with multiple optima. A single-component M-E model atmosphere is typically described by about 7 free parameters, indicating a fairly high parameter space dimensionality. Two-component models increase the ability to fit frequently-observed asymmetric spectral lines, at the price of nearly doubling the dimension of the parameter space. Furthermore, spectral lines for large magnetic field strengths and large inclinations are very similar to profiles for weaker field strengths and small inclinations, indicating the potential presence of multiple optima that correspond to very different physical conditions. This poster presents an initial investigation into alleviating these difficulties by incorporating a more sophisticated evolutionary strategy into the SGA, and parallelizing over multiple processors.

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