Sound speed inversions of an ensemble of low-mass main-sequence stars

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Abstract

Even the best asteroseismic models of solar-like oscillators show significant differences from the observed oscillation frequencies. Structure inversions seek to use these frequency differences to infer the underlying structure differences. While used extensively to study the Sun, sound speed inversion results for other stars have so far been limited. Applying sound speed inversions to a broader set of stars allows us to probe stellar theory over a larger range of conditions, as well as look for overall patterns that may hint at deficits in our current understanding. To that end, we present inversion results for 15 main-sequence stars with radiative cores. We find several cases where the inversions reveal significant differences between the sound speed profile of the star and that of its model. Furthermore, we note a trend across the ensemble for the sound speed in the cores of our stellar models to be lower than those in actual stars. We examine whether changing the microphysics of our models improve them.

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