In a previous work (Corbard & Thompson, 2002), MDI f-modes with spherical harmonic degrees up to ℓ=300 have been used to infer properties of the radial gradient of angular velocity in the near sub-photospheric layers. This information is very important in order to better constrain numerical models of the convection in this layer.

Local helioseismology, however, gave hints that the resolution reached by our global mode analysis might not be enough to reveal the full complexity of the angular velocity gradients and their radial variations.

In this work we use frequency splittings estimated from a ridge fitting technique for degrees up to ℓ=1000 (Reiter, 2007) in order to reach a higher resolution in the radial direction close to the photosphere. We show that the linear assumption used in the previous work cannot be kept anymore when using this new dataset and present our first results obtained by inverting the new data.

**Ridge Fitting Technique (1)**

For the ridge fitting we employ the multi-peak, inversion method (MPIM method; France et al. 2002, 2005; Reiter 2007). This MPFT method operates directly upon all of the modes in a multiplet of given ℓ, Γ, and employs a sum of a series of ridge curves centered at each multiplet member (located at a given ℓ, Γ) to derive the observables. Different ridge functions can be used, including a linear, a polynomial, or a Gaussian distribution. The MPIM method determines the mode parameters to be either a symmetric Lorentzian profile or the asymmetric profile of Ritzwoller & Lavely (1991).

As a result, 2ℓ+1 set of model parameters (amplitude, frequency, line width, line asymmetry, background) are obtained for each multiplet in ℓ, Γ. By examing the 2ℓ+1 estimated frequencies νℓ,Γ in a multiplet in either the orthogonal polynomials introduced by Ritzwoller & Lavely (1991) or in a Legendre polynomial expansion, the frequency ν0,0' and the coefficients of that multiplet can be determined.

Because the power in a single frequency bin of a tesseral or zonal spectral section obeys an exponential rather than a Gaussian distribution, the mode parameters have to be estimated by a maximum-likelihood method rather than by an inversion method.

The results presented here were obtained using the asymmetric profile of Ritzwoller & Lavely (1991) and the Ritzwoller & Lavely (1991) polymorphisms throughout.

**Comparison with “standard MDI splittings”**

We have estimated the radial velocity gradient at 3 different latitudes, corresponding to the shallowest rotation profile (the isolated full line) is pretty well compatible with the sub-photospheric layers. This information is very important in order to better constrain numerical models of the convection in this layer.

Local helioseismology, however, gave hints that the resolution reached by our global mode analysis might not be enough to reveal the full complexity of the angular velocity gradients and their radial variations.

In this work we use frequency splittings estimated from a ridge fitting technique for degrees up to ℓ=1000 (Reiter, 2007) in order to reach a higher resolution in the radial direction close to the photosphere. We show that the linear assumption used in the previous work cannot be kept anymore when using this new dataset and present our first results obtained by inverting the new data.

**Conclusions & Perspectives**

The ridge fitting method developed produce splitting coefficients in good agreement with MDI standard results within the range of spherical harmonic they share. This preliminary work is encouraging concerning the potential of such a method for a given dataset. With the resolution reached by our global mode analysis, we plan to analyze data sets covering a wider period and we will attempt to use our new technique to reach higher latitudes.