Correcting for MDI Image Distortion

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• Radial (cubic) optical distortion

• Elongation due to tip of camera plane
  N.B. this also affects measured center position

• Position-angle error

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## Maximum displacement vs. $r$, full-disc pixel

<table>
<thead>
<tr>
<th>$r$</th>
<th>optic</th>
<th>tip</th>
<th>PA</th>
<th>all</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>0.12</td>
<td>0.36</td>
<td>0.89</td>
<td>1.08</td>
</tr>
<tr>
<td>0.866</td>
<td>0.61</td>
<td>0.92</td>
<td>1.55</td>
<td>2.22</td>
</tr>
<tr>
<td>0.94</td>
<td>0.77</td>
<td>1.06</td>
<td>1.68</td>
<td>2.53</td>
</tr>
</tbody>
</table>

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Tracking(mapping corrections validated by creating “Level 2” corrected datasets (similar to GONG *zi) (can be made publicly available if there is interest)

Level 2 photograms run through limb-fitting to verify the camera tip correction

Level 2 Dopplergrams tracked and ring-fit for comparison with corrected tracking of Level 1: no significant or systematic differences
Differences in $U$ between fits to full-rotation averages of original and corrected tracked data, CR 1910 (June 1996)

modes averaged over ranges of ±0.1 in log (nu/l)
Differences in $l$ between fits to full-rotation averages of original and corrected tracked data, CR 1910 (June 1996): single location, common modes
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Differences in $l$ between fits to full-rotation averages of original and corrected tracked data, CR 1910 (June 1996)

modes averaged over ranges of ±50 in $l$ and all $n$
Effect of radial distortion correction on inferred flows: -2*correction
(single day)
Effect of camera tip correction on inferred flows: \(-2*\text{correction}\) (single day)

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Effect of position angle correction on inferred flows: -2*correction (single day)