BO - A powerful fluid and kinetic plasma wave and instability analysis tool

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-Introduction

• BO (‘波’, i.e., ‘wave’ in Chinese) currently includes BO-F (PDRF, multi-fluid solver) and BO-K (PDRK, kinetic solver).
• BO-K (PDRK) solves uniform plasma dispersion relation with an extended Maxwellian based equilibrium distribution function.
• For D(omega, k)=0, give k, solve series omega(s).

• What make BO attractive? Solves the difficulty of root finding, i.e., the first solver not requires initial guess and can give all the important solutions at one time. You do not need luck any more!

• Supports: anisotropic temperature / loss cone / drift in arbitrary direction / ring beam / collision, unmagnetized / magnetized species, electrostatic/electromagnetic/Darwin, can kpara<=0, etc.

-Typical example

• Fast-magnetosonic/whistler dispersion surface

- Refs:


-Solvers compare*

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</thead>
<tbody>
<tr>
<td>Initial guess?</td>
<td>Not required</td>
<td>Must</td>
<td>Must</td>
<td>Must</td>
</tr>
<tr>
<td>Fast?</td>
<td>Middle</td>
<td>Fast</td>
<td>Middle</td>
<td>Middle</td>
</tr>
<tr>
<td>Support high harmonic?</td>
<td>Easy</td>
<td>Difficult</td>
<td>Difficult</td>
<td>Difficult</td>
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<tr>
<td>Separate modes?</td>
<td>Easy</td>
<td>Difficult</td>
<td>Difficult</td>
<td>Difficult</td>
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<tr>
<td>All solutions?</td>
<td>Yes</td>
<td>No</td>
<td>Multi solutions in given range</td>
<td>No</td>
</tr>
<tr>
<td>With perp drift?</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>With collision?</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Key feature</td>
<td>All solutions, rich models</td>
<td>Fast, widely used</td>
<td>Multi solutions</td>
<td>Kappa distribution</td>
</tr>
</tbody>
</table>

*Other solvers not shown here, e.g., P. Gary’s, Verscharen’s, ...

BO Contributors/Users Map (2018)

-Download:

• http://code.ennresearch.com/bo/ (with latest version)
• https://github.com/hsxie/pdrk (v181027 and older)

Welcome to join us/spread this poster!

-Ackn:

• R. Denton, Xin Tao, Jin-song Zhao, Zhong-wei Yang, Chao-jie Zhang, Can Huang, Wen-ya Li, Liang Wang, Kyunguk Min, Yang Li, Kyunghwan Dokgo, J. L. Burch,...