

metrix

Calculates the metric quantities required for volume integrals.

[called by: [ma00aa.](#)]

[calls: [coords.](#)]

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1.1 metrics

1. The Jacobian, \sqrt{g} , and the ‘lower’ metric elements, $g_{\mu\nu}$, are calculated by [coords](#), and are provided on a regular grid in ‘real-space’, i.e. (θ, ζ) , at a given radial location, i.e. where s is input.

1.2 plasma region

1. In the plasma region, the required terms are $\bar{g}_{\mu\nu} \equiv g_{\mu\nu} / \sqrt{g}$.

$$\begin{aligned}
 \sqrt{g} \, g^{ss} &= (g_{\theta\theta} g_{\zeta\zeta} - g_{\theta\zeta} g_{\theta\zeta}) / \sqrt{g} \\
 \sqrt{g} \, g^{s\theta} &= (g_{\theta\zeta} g_{s\zeta} - g_{s\theta} g_{\zeta\zeta}) / \sqrt{g} \\
 \sqrt{g} \, g^{s\zeta} &= (g_{s\theta} g_{\theta\zeta} - g_{\theta\theta} g_{s\zeta}) / \sqrt{g} \\
 \sqrt{g} \, g^{\theta\theta} &= (g_{\zeta\zeta} g_{ss} - g_{s\zeta} g_{s\zeta}) / \sqrt{g} \\
 \sqrt{g} \, g^{\theta\zeta} &= (g_{s\zeta} g_{s\theta} - g_{\theta\zeta} g_{ss}) / \sqrt{g} \\
 \sqrt{g} \, g^{\zeta\zeta} &= (g_{ss} g_{\theta\theta} - g_{s\theta} g_{s\theta}) / \sqrt{g}
 \end{aligned} \tag{1}$$

1.3 FFTs

1. After constructing the required quantities in real space, FFTs provided the required Fourier harmonics, which are returned through global. (The “extended” Fourier resolution is used.)