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Error Field Correction in DIII-D Ohmic Plasmas with Either Handedness

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The expression for the overlap, Equation (1) in the published article at Nuclear Fusion **51** (2011) 023003, was incorrect and should be replaced by

$$\mathcal{C} \equiv \sqrt{\frac{\oint d\varphi' \left[\oint da(\delta\vec{B}^x \cdot \hat{n}_b)(-\vartheta, \varphi' - \varphi)(\delta\vec{B}^x_d \cdot \hat{n}_b)(\vartheta, \varphi)\right]^2}{\oint da(\delta\vec{B}^x \cdot \hat{n}_b)^2 \oint da(\delta\vec{B}^x_d \cdot \hat{n}_b)^2}}. \tag{1}$$

We also found that it would be worthwhile to add more descriptions. This is the Root-Mean-Square integration over φ', after the convolution integral to $(\vartheta = 0, \varphi = \varphi')$ between the two distribution functions of magnetic field. The extra degree of the freedom, only in the toroidal angle, is because the reference toroidal angle of the dominant field distribution $\delta\vec{B}_d(\vartheta, \varphi)$ can be arbitrary due to the toroidal symmetry in a tokamak. This expression becomes simply the dot product of the two normalized matrix vectors in the complex Fourier space, if one decomposes a magnetic field as

$$\sqrt{\mathcal{J}|\vec{\nabla}\psi|}(\delta\vec{B}^x \cdot \hat{n}_b)(\vartheta, \varphi) = \sum_{mn} \Phi_{mn} e^{i(m\vartheta - n\varphi)}. \tag{2}$$

Note the additional factor associated with the Jacobian of the surface area, $\mathcal{J}|\vec{\nabla}\psi|$, to have the surface area integral $da = \mathcal{J}|\vec{\nabla}\psi| d\vartheta d\varphi$ independent of coordinates. It is then straightforward to show Equation (1) becomes the dot product between a given magnetic field $\vec{\Phi} = \{(m, n)|\Phi_{mn}\}$ and the dominant magnetic field $\vec{\Phi}_d = \{(m, n)|\Phi_{dmn}\}$ as

$$\mathcal{C} \equiv \frac{|\vec{\Phi} \cdot \vec{\Phi}_d|}{|\vec{\Phi}||\vec{\Phi}_d|}. \tag{3}$$

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