
SPD Magnetic System

toroid + coils (ver. TS-1, TS-2)

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«TS-1» model geometry

1/2 model symmetry

$$B^{(z)}(x, y, 0) = 0.$$

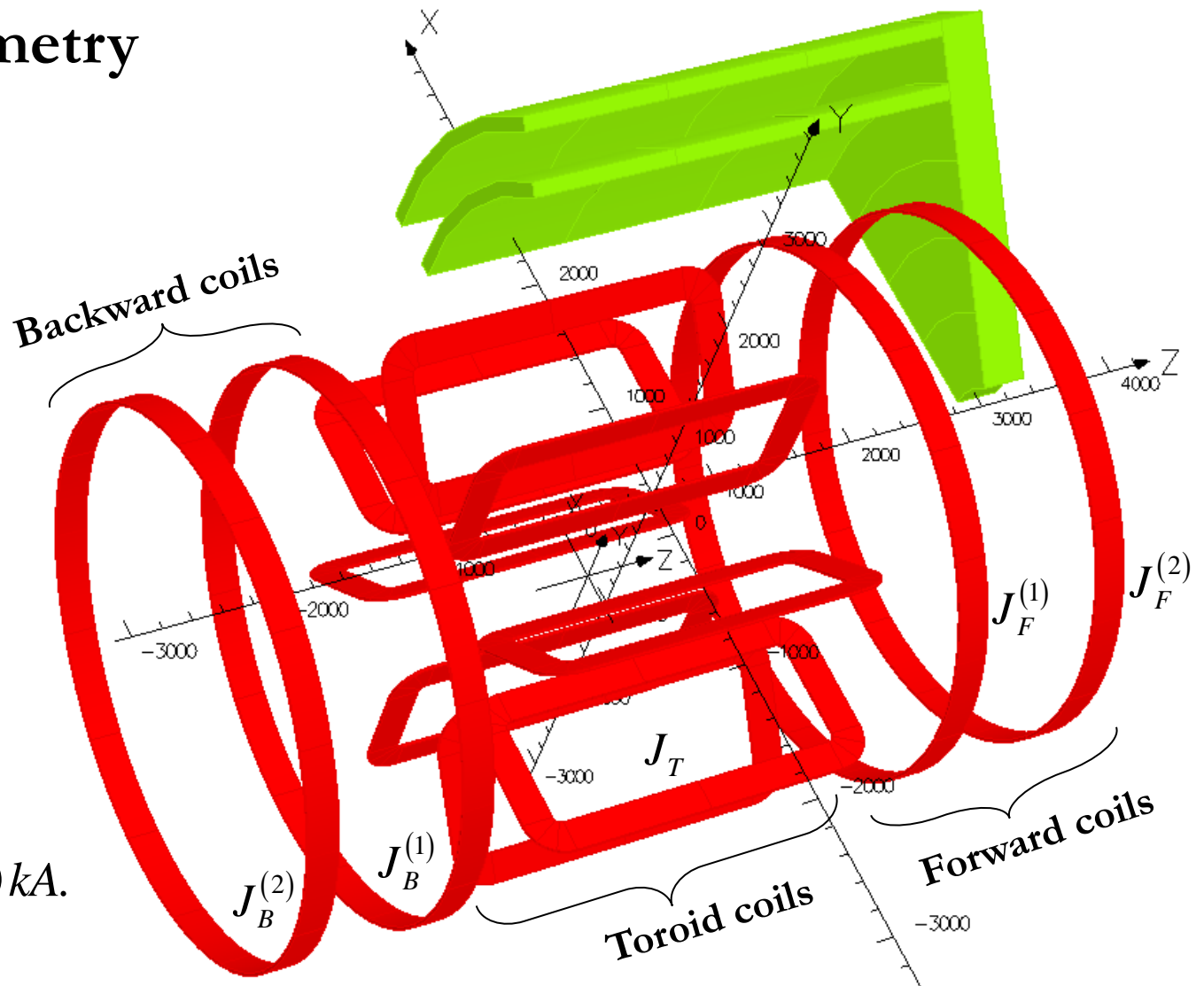
$$J_T = 40 \frac{\text{A}}{\text{mm}^2},$$

$$J_{B \setminus F}^{(1,2)} = \text{m}80 \frac{\text{A}}{\text{mm}^2},$$

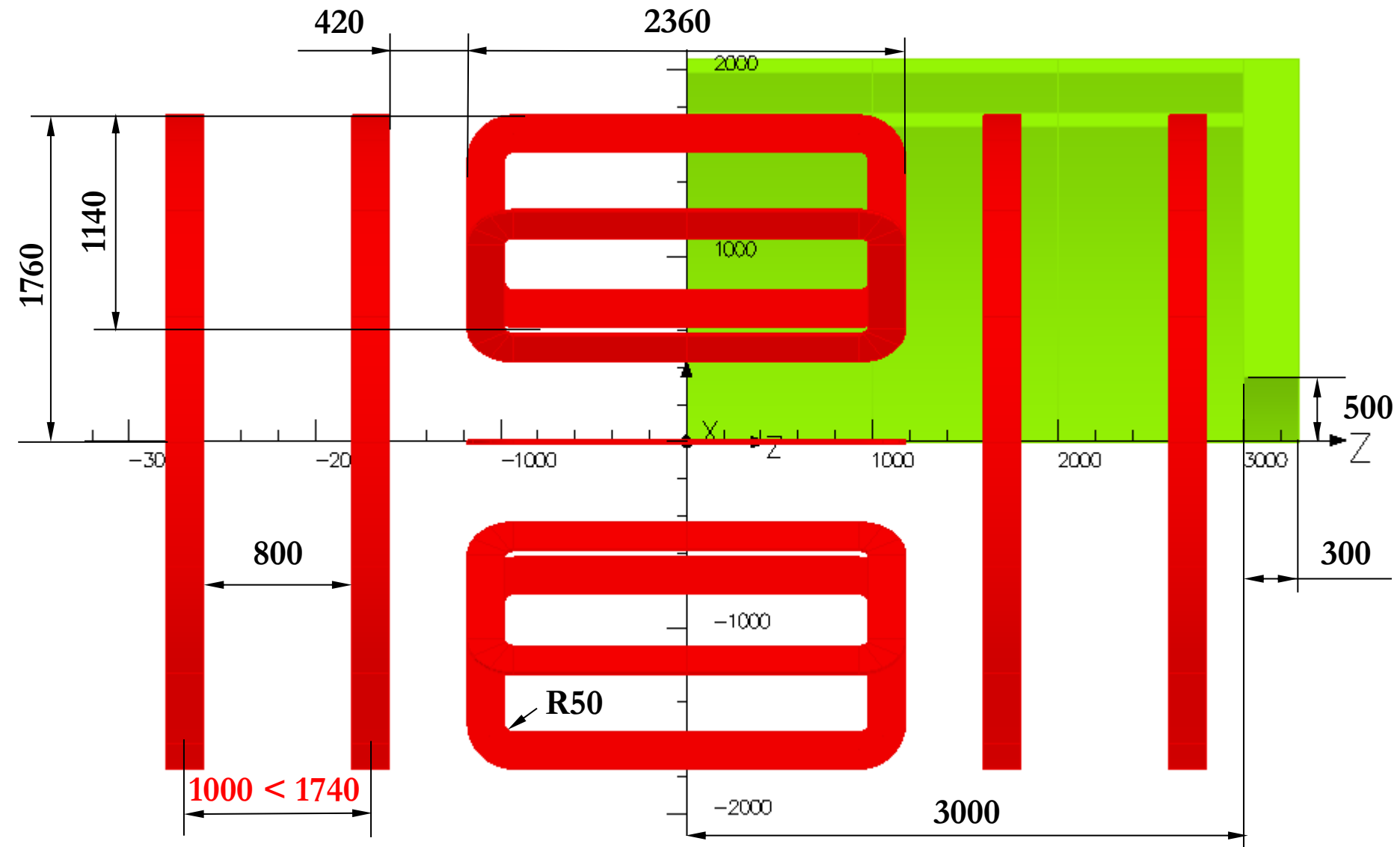
$$S = 200 \times 20 \text{ mm}^2,$$

$$I_T = J_T \cdot S = 160 \text{ kA},$$

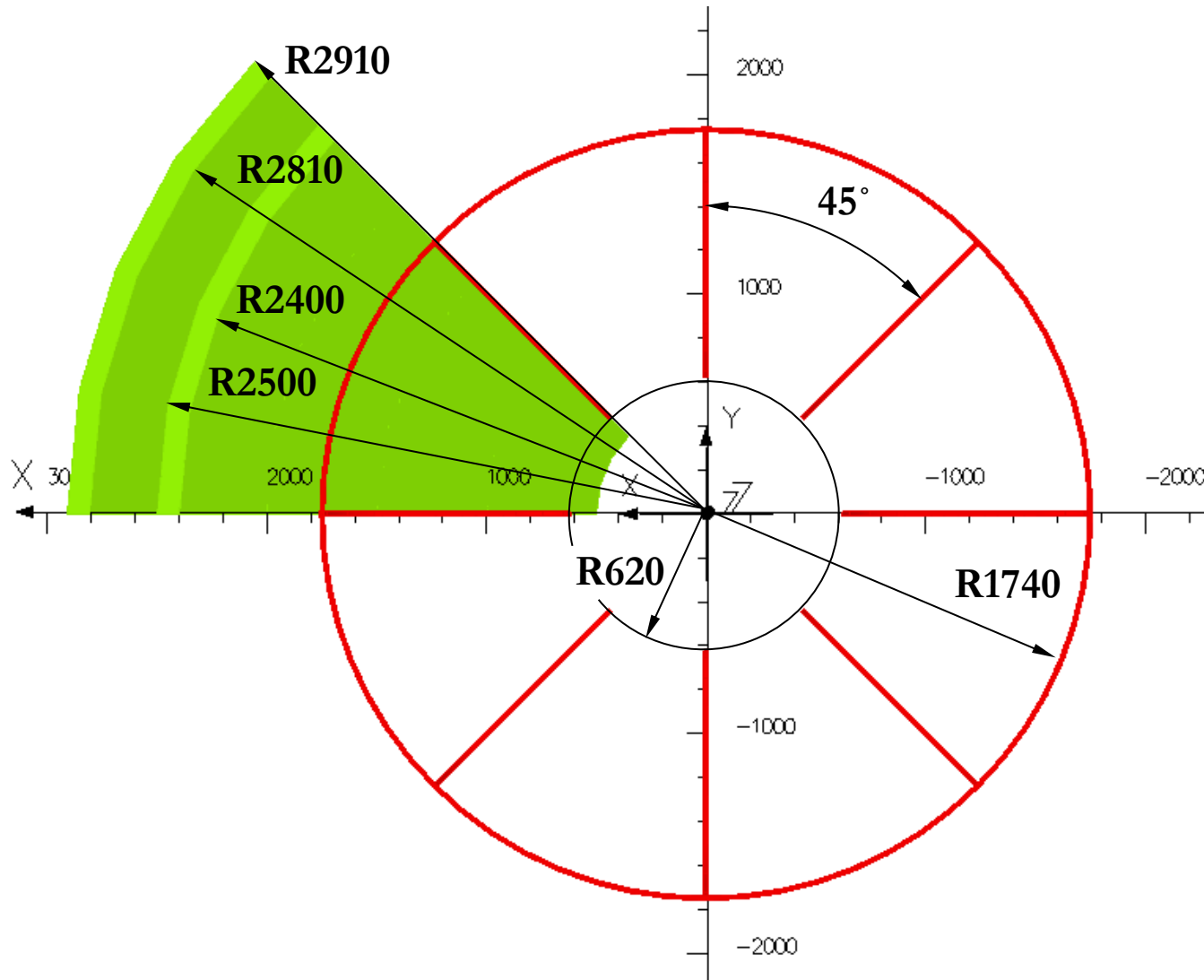
$$I_{B \setminus F} = J_{B \setminus F} \cdot S = \text{m}320 \text{ kA}.$$



«TS-1» model geometry

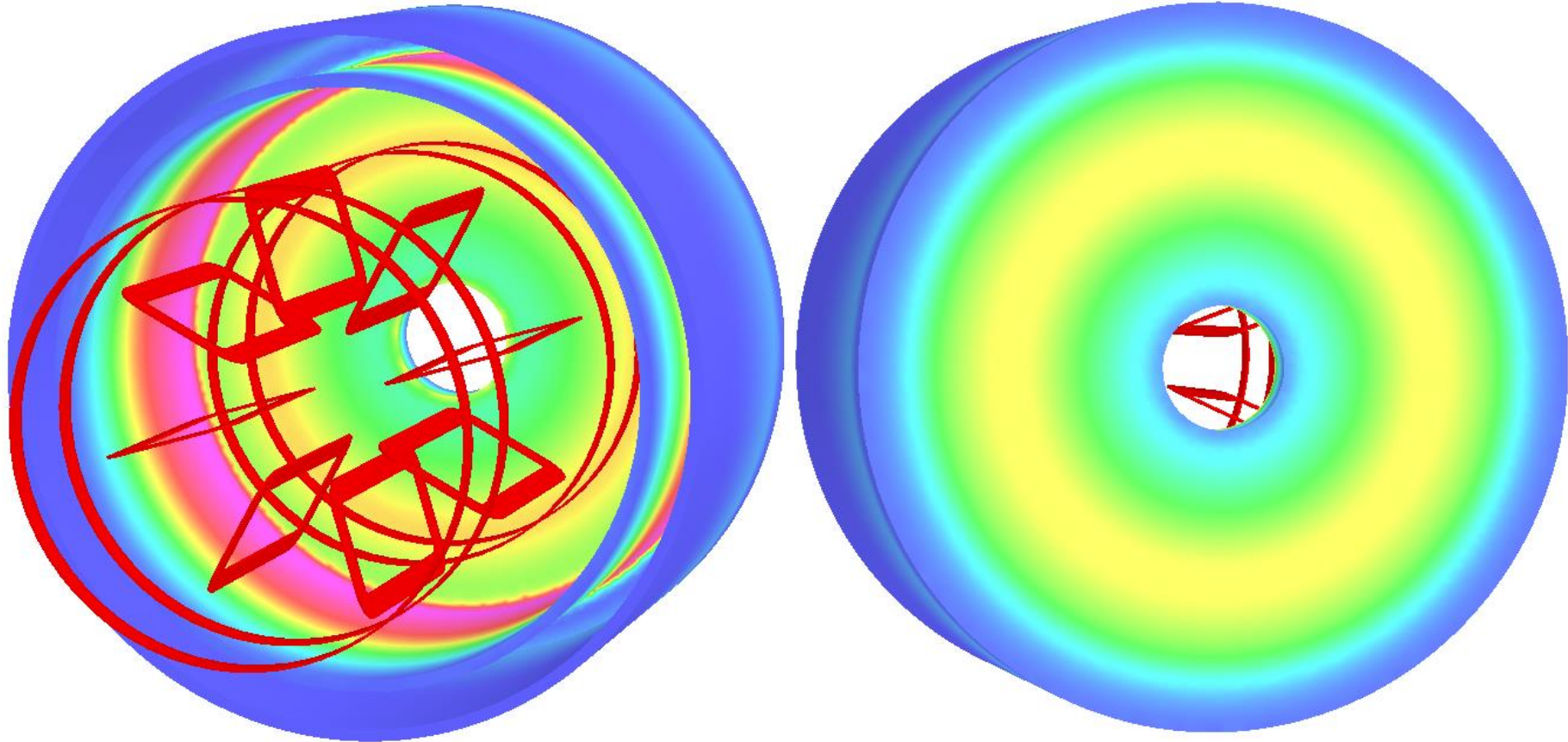


«TS-1» model geometry



«TS-1». Total $|B|$ field. Surface distribution

$B_{\max} = 1.793 \text{ T}$



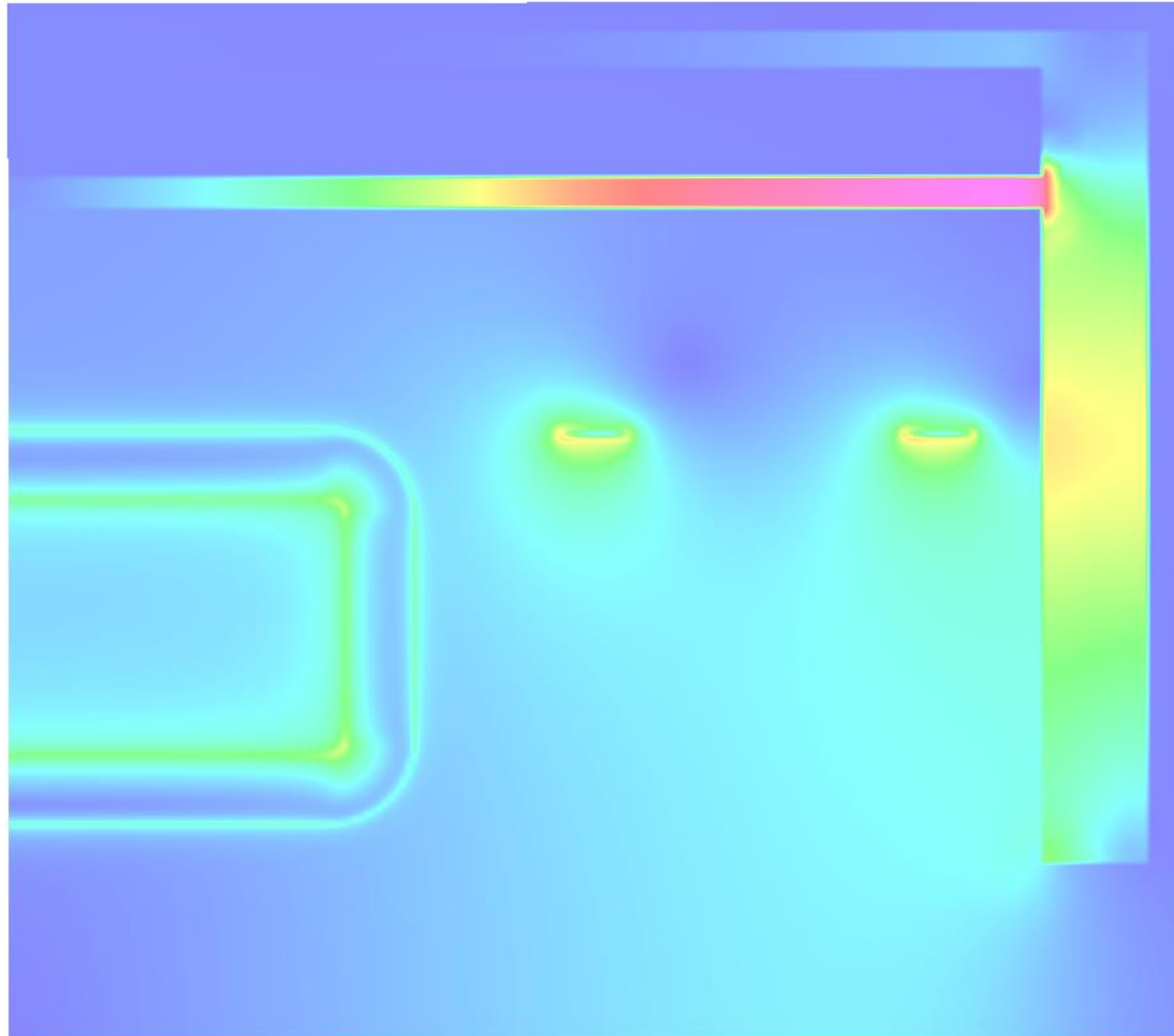
$B_{\min} = 0.02 \text{ T}$

«TS-1». Total $|B|$ field. RZ- distribution

$B_{\max} = 1.791 \text{ T}$

$$\Omega = \left\{ (r, \varphi, z) : \begin{array}{l} 0 \leq r \leq 3000 \\ \varphi = 0 \\ 0 \leq z \leq 3400 \end{array} \right\}$$

$B_{\min} = 0 \text{ T}$

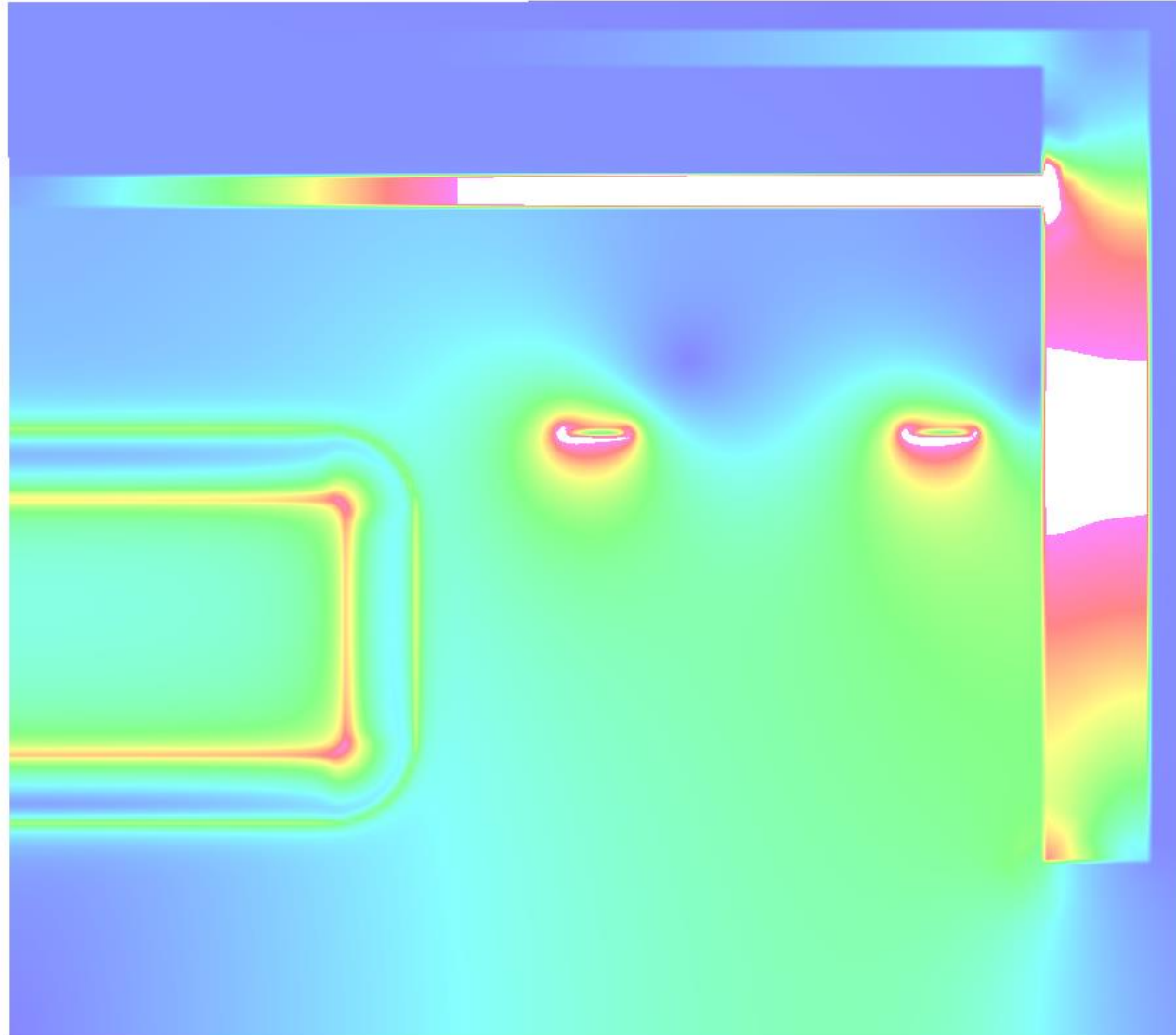


«TS-1». Total $|B|$ field. RZ- distribution

$B_{\max} = 1.0 \text{ T}$

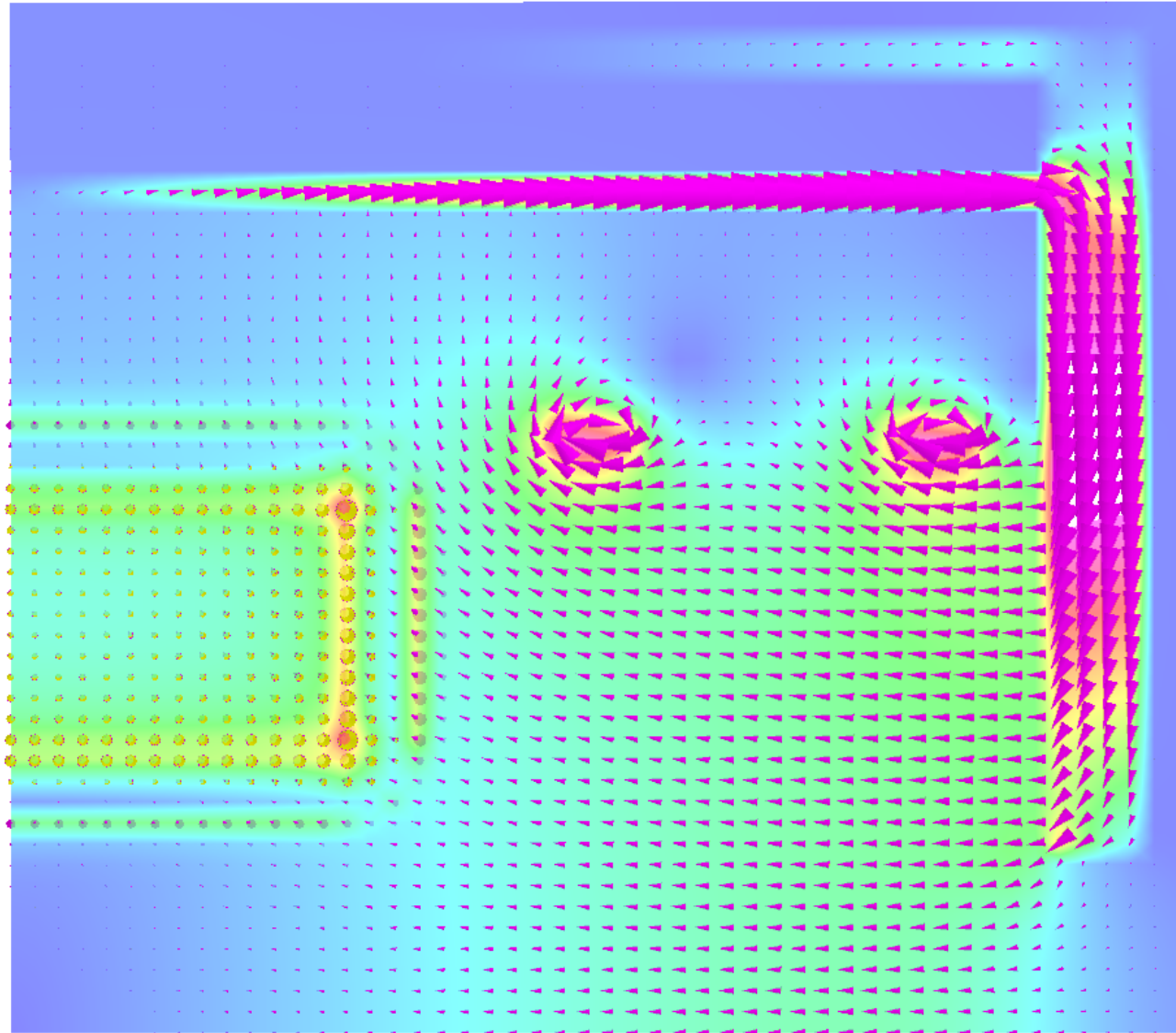
$$\Omega = \left\{ (r, \varphi, z) : \begin{array}{l} 0 \leq r \leq 3000 \\ \varphi = 0 \\ 0 \leq z \leq 3400 \end{array} \right\}$$

$B_{\min} = 0 \text{ T}$

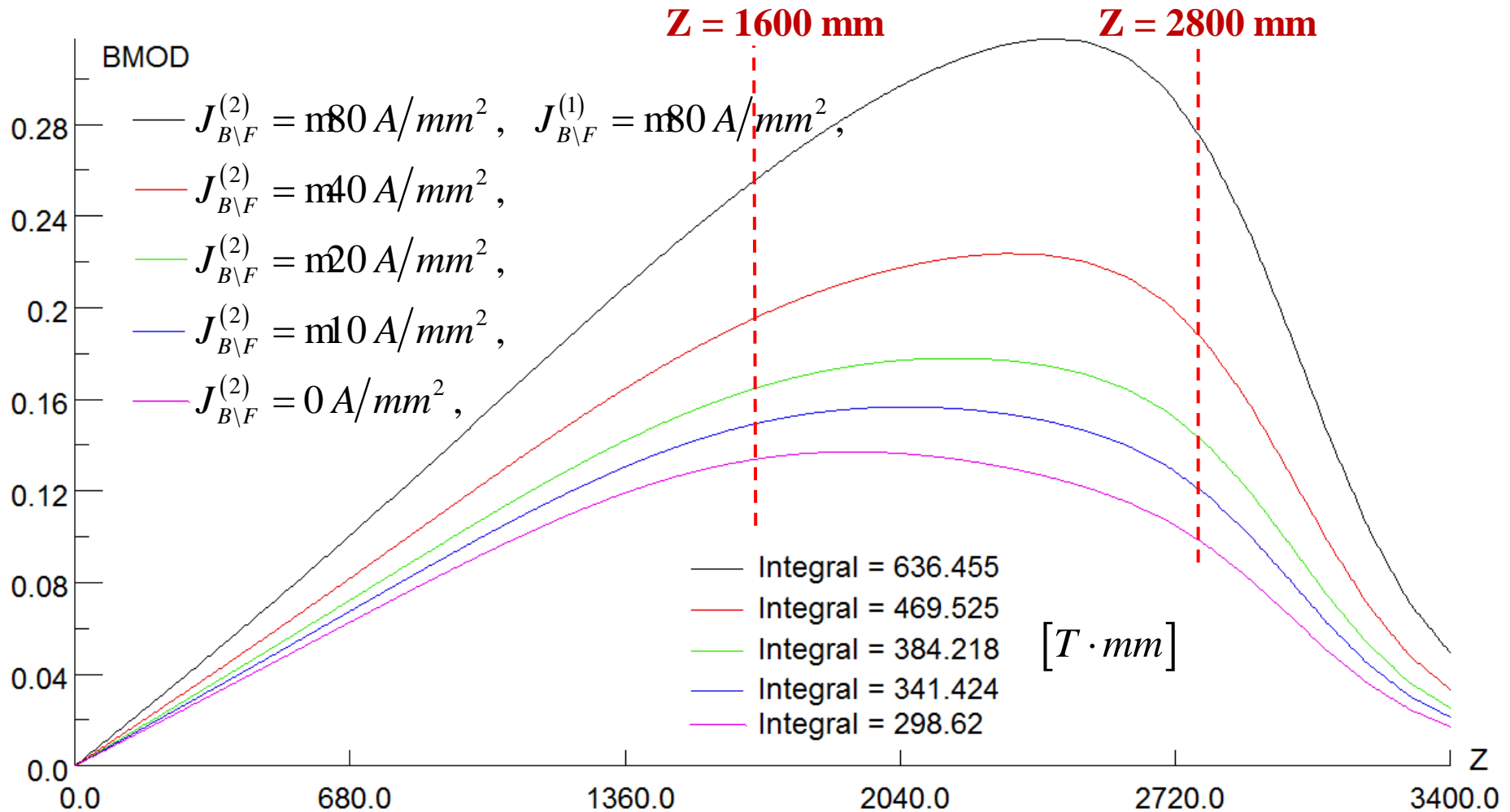


«TS-1». Vector field distribution

$$\Omega = \left\{ (r, \varphi, z) : \begin{array}{l} 0 \leq r \leq 3000 \\ \varphi = 0 \\ 0 \leq z \leq 3400 \end{array} \right\}$$



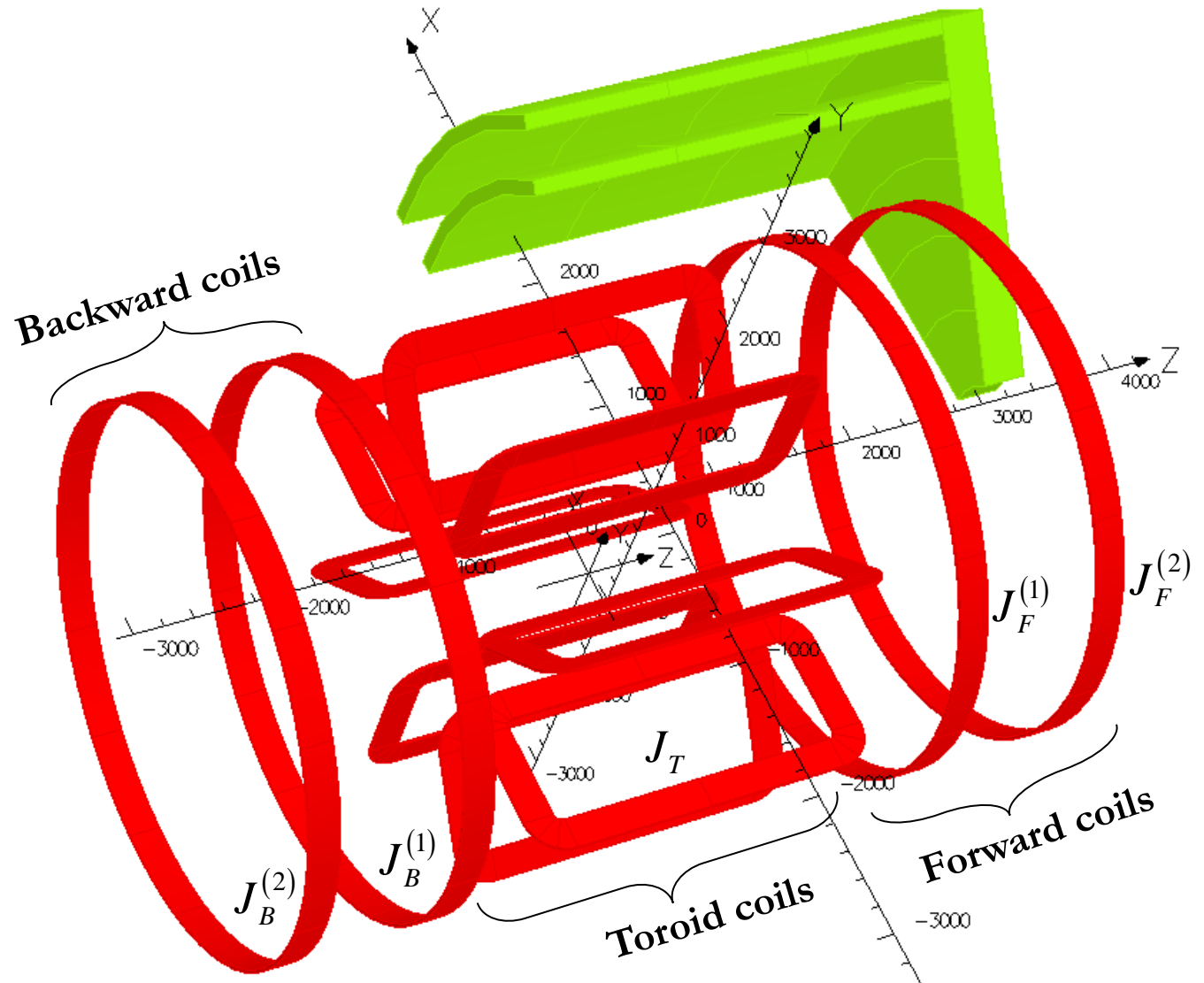
«TS-1». Total $|B|$ field distribution ($r = 0$)



«TS-2» model geometry

No symmetry

$$J_T = 40 \frac{A}{\text{mm}^2},$$
$$J_{B \setminus F}^{(1,2)} = 80 \frac{A}{\text{mm}^2}.$$

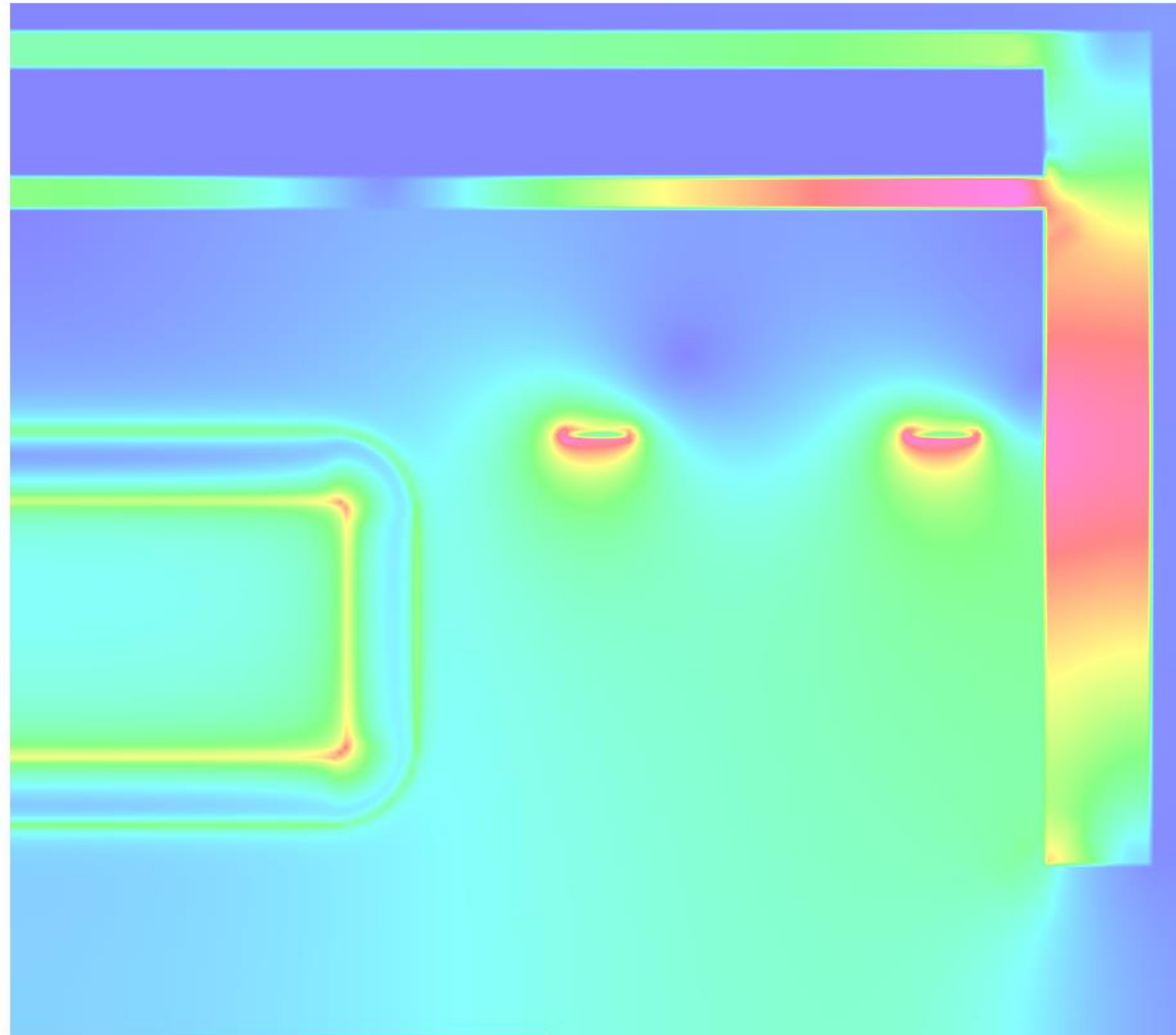


«TS-2». Total $|B|$ field. RZ- distribution

$B_{\max} = 1.217 \text{ T}$

$$\Omega = \left\{ (r, \varphi, z) : \begin{array}{l} 0 \leq r \leq 3000 \\ \varphi = 0 \\ 0 \leq z \leq 3400 \end{array} \right\}$$

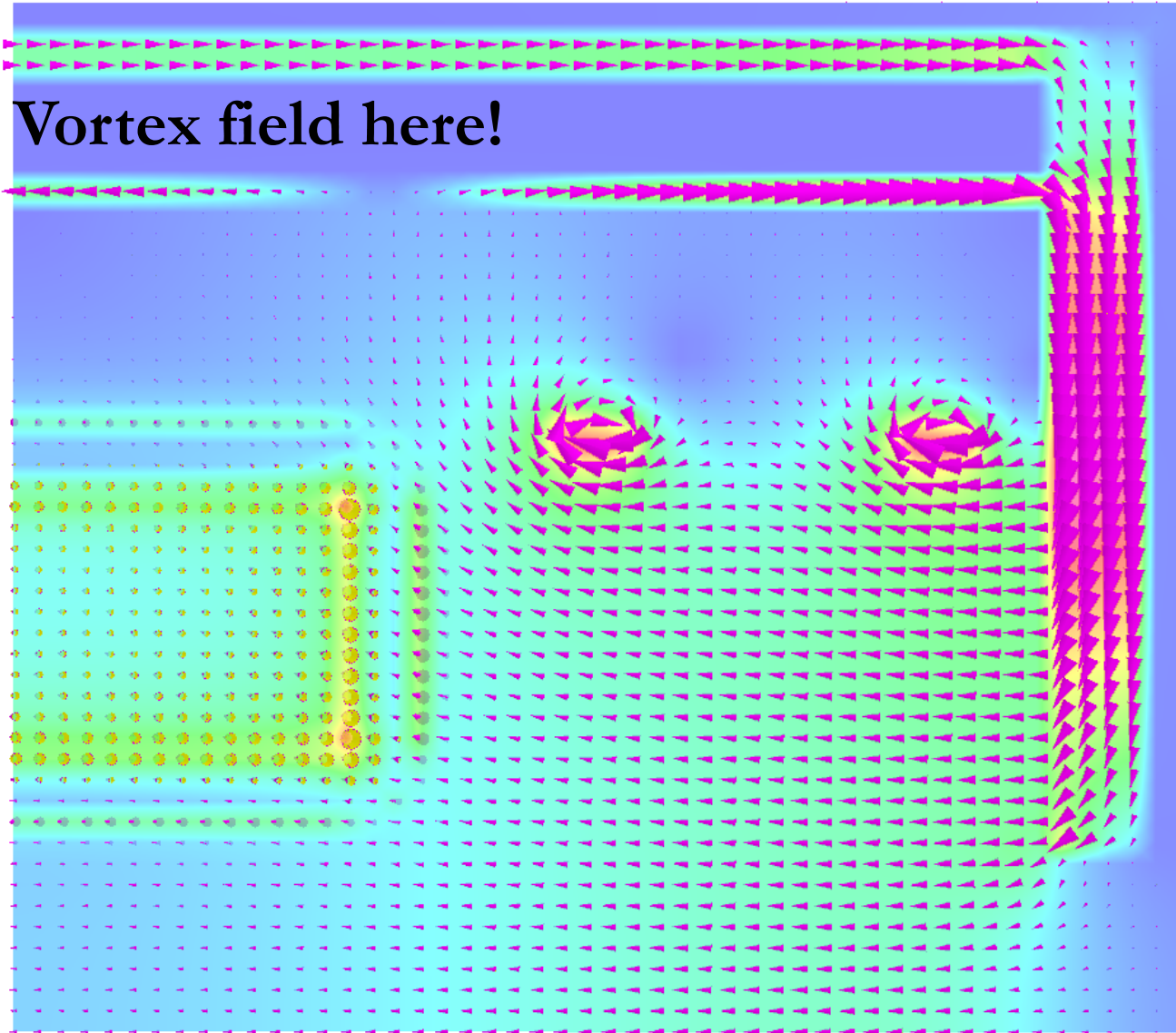
$B_{\min} = 0 \text{ T}$



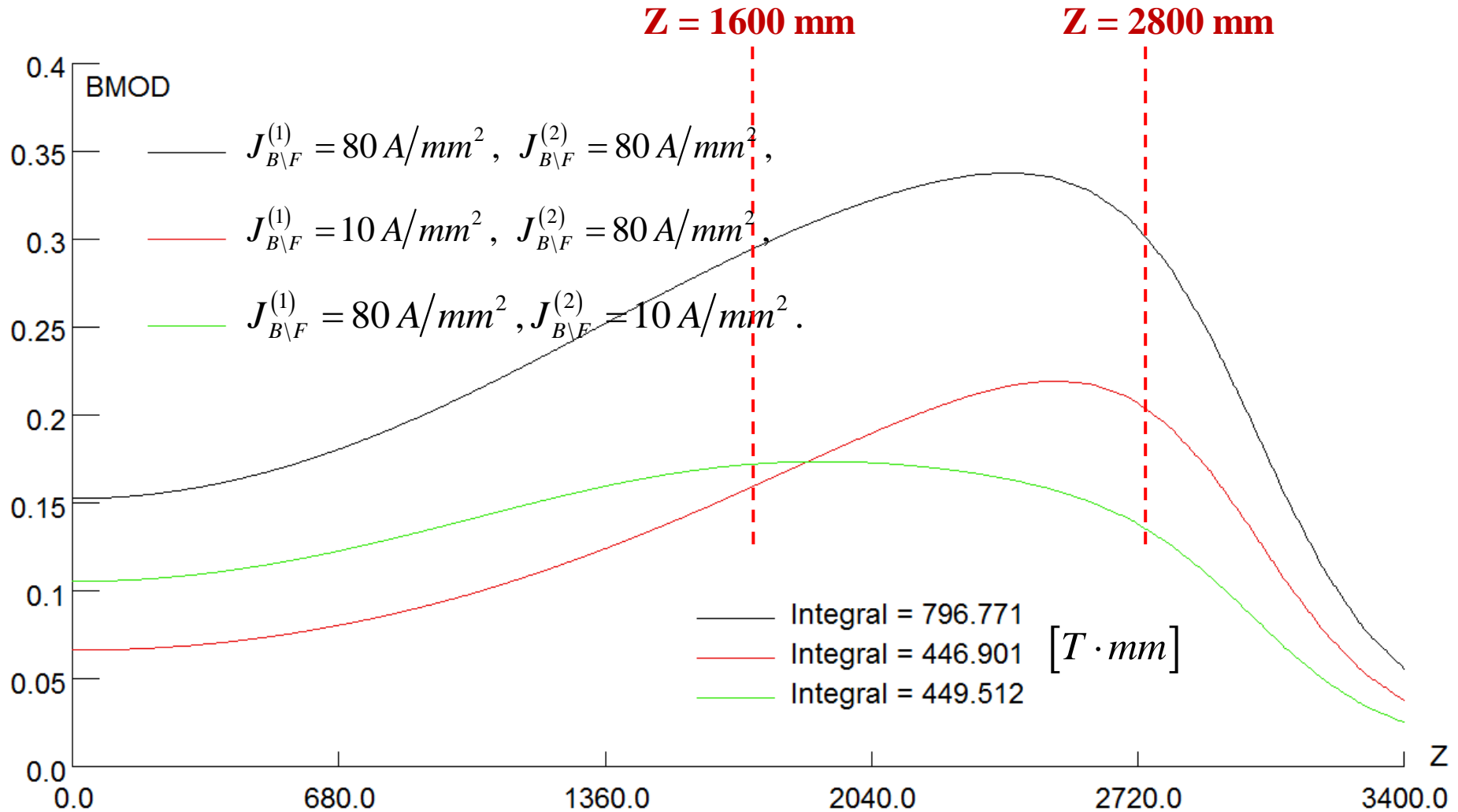
«TS-2». Vector field distribution

Vortex field here!

$$\Omega = \left\{ (r, \varphi, z) : \begin{array}{l} 0 \leq r \leq 3000 \\ \varphi = 0 \\ 0 \leq z \leq 3400 \end{array} \right\}$$



«TS-2». Total $|B|$ field distribution ($r = 0$)



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- **Field distribution is ready for further use for modeling**
 - **Necessary field amplitude can be normalized for needed value**
 - **Further optimization of the system version will be performed**
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