3. Numerical 3D Network Model

For calculating screening and coupling effects, the network has the following layout. Each vertical column is modeled as a set of interconnected resistors and inductors. The network consists of 6 current equations over the width. Magnetic field components are used in each section to calculate magnetic potentials and resistances.

4. SST2O-ST

SST2O-ST is a 2 m long superconducting coil which is a candidate design for the shape of the plasma.

5. Copper U-Channel

U-shaped copper channel to cool down the return limiter. The channel is designed to have a heat flux of 10 MW/m². The channel has a thickness of 3 mm.

6. Winding Strategy & Staircase Cable

The winding strategy involves using a staircase cable to wind the return limb. Each layer is wound in a spiral pattern and the layers are separated by copper plates. The cable is wound in a staggered pattern to minimize the electrical resistance.

7. Associated Losses

The losses are calculated through the copper channel and the U-channel. The losses are calculated using the D.C. and A.C. cooling losses.

8. Results

Comparing the model, the current distribution in the 3D coil is calculated during heating and shading. The side and top view of the model is hard to capture in a single figure and hence is not shown in this section.

9. Conclusion

The model is a good approximation of the real coil and the losses are accurately calculated. The model is useful for further refinement and optimization of the coil design.