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1. **Prabhakar Tripathi,** A. Kumar, S. Shee, S. Dwivedi, and P. K. Jain, "Beam-wave Interaction Analysis of X-band Gridless Reltron," ***URSI Asia-Pacific Radio Science Conference (URSI AP-RASC 2019),*** New Delhi, India, 09-15 March 2019.

2. **Prabhakar Tripathi,** A. Kumar, S. Dwivedi, and P. K. Jain, "The New Variant of High Power Super Reltron," ***Asia-Pacific Microwave Conference (APMC-2019)***, Singapore, 9-12, December 2019.

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APPENDIX-A

A.1. Derivation of the expression (2.39)

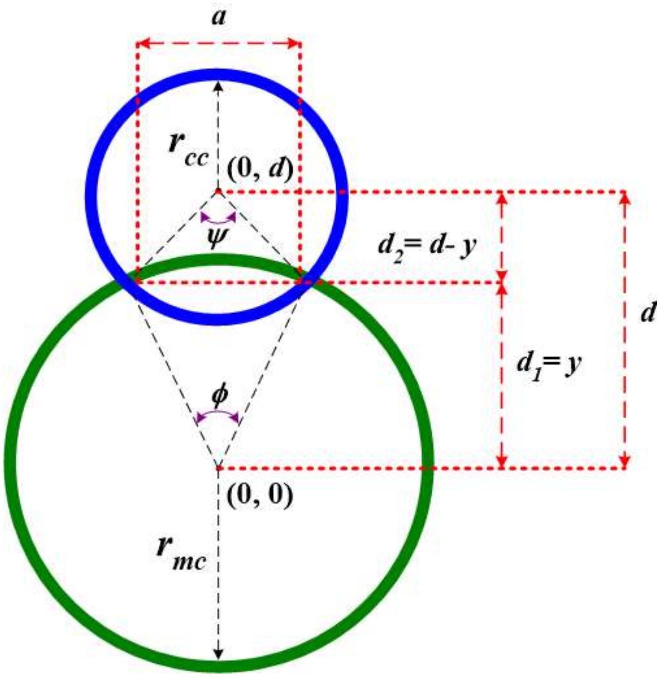

Figure A.1: Lateral cross-sectional view of the SCC.

Fig. A.1 shows the lateral cross-sectional view of the SCC. The bigger circle (green in color) indicates the main pillbox cavity and the smaller circle (blue) indicates the coupling cavity of the SCC. The common area (i.e. overlapped area) between these two circles is used for making a magnetic coupling slot. The main function of this magnetic coupling slot is to provide the magnetic coupling between the front and back main pillbox cavity. The area of the magnetic coupling slot is considered here to calculate the magnetic coupling coefficient (*k*). Using circle equations:

$$x^2 + y^2 = r_{mc}^2 \tag{A.1}$$

$$x^2 + (y - d)^2 = r_{cc}^2 \tag{A.2}$$

Combining equation (A.1) and (A.2) we get:

$$\left(r_{mc}^2 - y^2\right) + \left(y - d\right)^2 = r_{cc}^2 \tag{A.3}$$

Rearranging the above equation we get:

$$y = \frac{\left(r_{mc}^2 - r_{cc}^2\right) + d^2}{2d} \tag{A.4}$$

Putting the above equation in equation (A.1) we get:

$$x = \frac{1}{2d}\sqrt{4r_{mc}^2 d^2 - \left(r_{mc}^2 - r_{cc}^2 + d^2\right)^2} \tag{A.5}$$

Hence, the chord length *a* can be obtained as:

$$a = \frac{1}{d}\sqrt{4r_{mc}^2 d^2 - \left(r_{mc}^2 - r_{cc}^2 + d^2\right)^2} \tag{A.6}$$

The angle 'ϕ' can be calculated as:

$$\phi = 2\sin^{-1}\left(\frac{a}{2r_{mc}}\right) \quad \text{in radian.} \tag{A.7}$$

The total unperturbed area of the SCC is the summation of the total surface area of the main pillbox cavity and the surface area of the metal disc which is used at the center of the main pillbox cavity when there is no magnetic coupling is present. Therefore the unperturbed area can be written as:

$$\text{Unperturbed Area} = 2\pi r_{mc}\left(2D\right) + \left(2\pi r_h T\right) + 2\left(\pi\left(r_{mc}^2 - r_{cc}^2\right)\right) \tag{A.9}$$

The surface area removed from the main pillbox cavity (i.e. overlapped area) is

$$\text{Removed Area} = 2\pi r_{mc}\left(D\right)\left(\frac{\phi \times 180}{\pi}\right) \tag{A.10}$$

Hence, the magnetic coupling coefficient is obtained as:

$$k = \frac{\left(360\, r_{mc}\, D\phi\right)}{\pi\left(\left(2\, r_{mc}\, D\right) + \left(r_h\, T\right) + \left(r_{mc}^2 - r_{cc}^2\right)\right)} \tag{A.11}$$