To obtain \( Q \) it is necessary to integrate the square of the magnetic field over the cavity surface. It is given by:

\[
Q_R = \frac{722}{3} \left[ 1 + 0.168 (D/L)^2 \right] \left[ 1 + 0.168 (D/L)^3 \right]
\]

For copper \( R_s = 2.61 \times 10^{-4} \Omega \). \( R_s \) is the surface resistance in ohms, \( f \) is the frequency in MHz. Thus, for a given power dissipated in the cavity, the value of the maximum electric field, \( E_m \), and \( E_y \) at any point in the cavity can be obtained.

**TF011 Cavity Shunt Resistance**

After traversing a path tangent to the \( E_x \) circle, located at the middle of the cavity axis, as shown in Fig. 1, the relative field values are shown in Fig. 1. Using Fig. 2.

For copper, \( E_y = 2.61 \times 10^{-4} \), the space factor \( S_f \), the amplitude of \( E_y \) decreases as \( x \) deviates from \( y = 0.48a \) and \( x = 0.5a \). \( E_y \) decreases from its max value for three reasons:

1. The space factor \( S_f \), the amplitude of \( E_y \) decreases as \( x \) deviates from \( y = 0.48a \).
2. The direction factor \( D_f \), the \( x \) component of \( E_y \) decreases as \( x \) moves away from the \( y \)-axis.

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lances of the TMQ\textsuperscript{011} over a TQ\textsuperscript{011}. Titus, for structures
the values of the improvement factors given in Fig. 5
should be halved. The cavities can be parallel coupled
with a TEM line similarly to the CESR(4) structure.

Accelerating Structure

Several cavities can be placed in tandem to form
an accelerating structure as shown in Fig. 6. Because

Perturbation of Cavity Geometry

It is hoped that the holes for the beam passage and
for coupling into and between cavities, will not perturb
the TQ\textsuperscript{011} mode sufficiently to negate its advantages.
We can temper with the geometry, put drift tubes inside
the cavity to shield the particles from the E field near
the wall, or make the cavity elliptical. Both perturba-
tions will increase the nonsuperconducting shunt resis-
tance and the maximum gradient but will cause E lines to
terminate on the surface and negate the main purpose
FIG. 7. TE_{111} cavity with half-cylinder ridge.

FIG. 8. TE_{111} cavity with rectangular ridge.

FIG. 9. A cavity structure created by drilling cylindrical TE_{111} cavities in a cascade.

Other Types of Geometric Variations:

One reason for the low power output and low resistance field gradient is that only a fraction of the electric field circle is used for amplification. One way to get around this is to place an isolated conductor along the field circle and feed the signal. This will substitute over a large fraction of the circular-conducting current for displacement current. The complete field circle will not be reproduced because the cavity will be one smaller, and the signal of will decrease. This modification makes the cavity the same as the Argonne cavity (11) except without the test.

A way to make one of the high and large energy storage capacity of a Higg's cavity and still have an effective high current resistance and field gradient is to
Reference: