1. **NON-DIMENSIONALIZING**

This is the process of non-dimensionalizing the shear stress equation

Where the dimensionless parameters are:

Substituting and simplifying:

Similarly:

The maximum shear stress, according to the Mechanics of Material textbook, is given by:

Therefore, after rearranging and simplifying:

Where:

z = the function to be called in the Matlab code

1. **COMMENTS ON RESULTS**

It can be seen from the plots that the non-dimensional shear stress is the greatest at around the origin. From the 3D surface plot, a sharp spike is seen in the middle of the X-Y plane. The fact that it is red indicating that the shear stress is the maximum. Additionally, the 2D contour plot, which shows a top view of the previous surface plot, indicates very clearly that the maximum value of the shear stress occurs around the origin. It could be said that due to the nature of the applied force, which acts on a particular location, the plots have those shapes. If the force is applied evenly across the plate, then we will not be able to see interesting feature such as the spike. Another interesting concept would be that the contours follow circular patterns. This means that for an arbitrary force, the result would always follow such patterns. Additionally, this circular pattern shows a strong resemblance with the Mohr’s circle, which connects the shear stress and normal stresses and is also circular.

1. **REFERENCES**

Beer, Ferdinand P. *Mechanics of Materials*. New York: McGraw-Hill, 2011. Print.