ANSYS - Plate with a Hole - Step 4

Step 4: Specify geometry

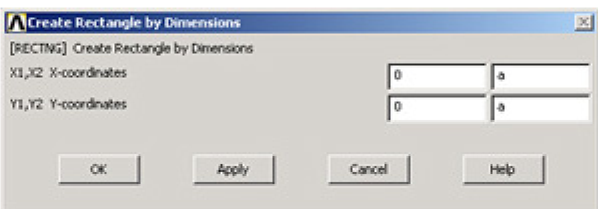
Since the geometry, material properties and loading are all symmetric with respect to the horizontal and vertical centerlines, we need to model only a quarter of the plate. We will take the origin of the coordinate system to be at the center of the hole and model only the top right quadrant. We'll create the geometry by creating a square area of side *a* and subtracting the circular sector of radius *r* from it.

Create the Square

Main Menu > Preprocessor > Modeling >Create > Areas >Rectangle > By Dimensions

X1 and ***X2*** are the x-coordinates of the left and right edges of the square, respectively. Enter `0` for ***X1***, a for ***X2***.

Y1 and ***Y2*** are the y-coordinates of the bottom and top edges of the square, respectively. Enter `0` for ***Y1***, a for ***Y2***.



Click ***OK***. You should see a square appear in the graphics window.

Create the Circular Sector

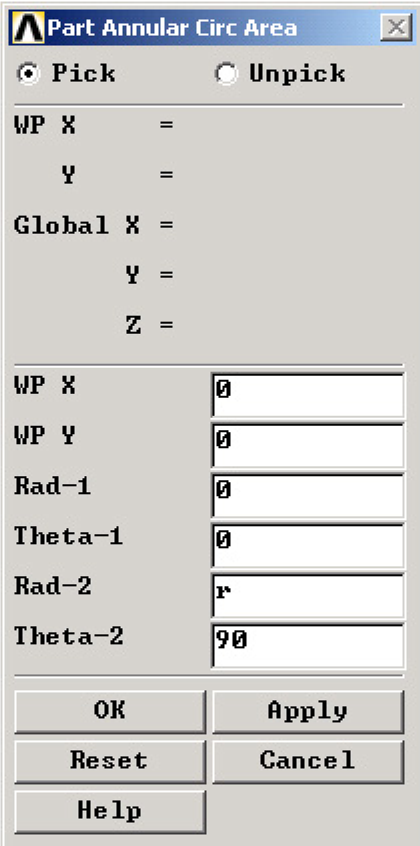
Main Menu > Preprocessor > Modeling > Create > Areas > Circle > Partial Annulus

WP X and ***WP Y*** are the x- and y-coordinates of the center of the circular arc. So enter 0 for both ***WP X*** and ***WP Y*** (*WP* refers to the *Working Plane* which by default coincides with the global Cartesian coordinate system. We won't have to worry about the working plane in this friendly example.)

Rad-1 is the radius of the inner circular arc. We want to create a solid rather than an annular arc. Enter `0` for ***Rad-1*** to create a solid arc.

Rad-2 is the (outer) radius of the arc. Since we had defined the hole radius as parameter *r* earlier, enter `r` for ***Rad-2***.

Theta-1 and ***Theta-2*** are the starting and ending angles of the arc, respectively. These angles need to be specified in degrees. Enter `0` for ***Theta-1*** and `90` for ***Theta-2***. Click ***OK***.

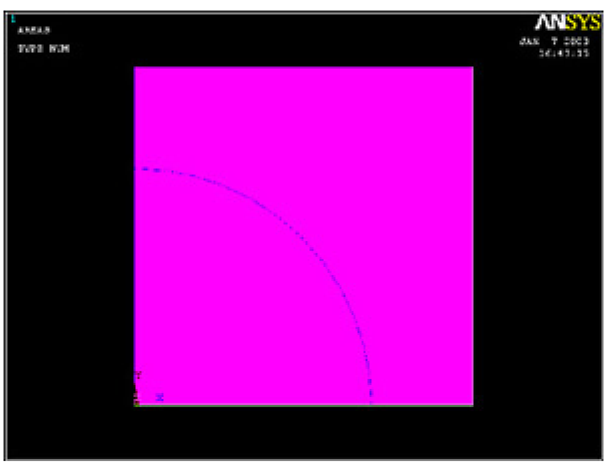


This will create and draw the circular sector. You'll see a white line denoting the circular sector.

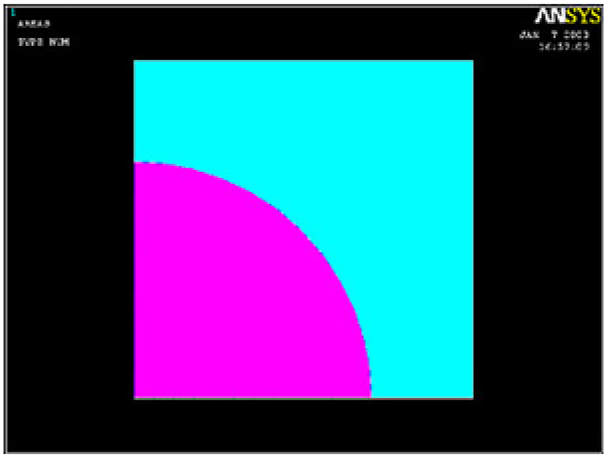
Subtract Circular Sector from Square

Main Menu > Preprocessor >Modeling > Operate > Booleans > Subtract > Areas

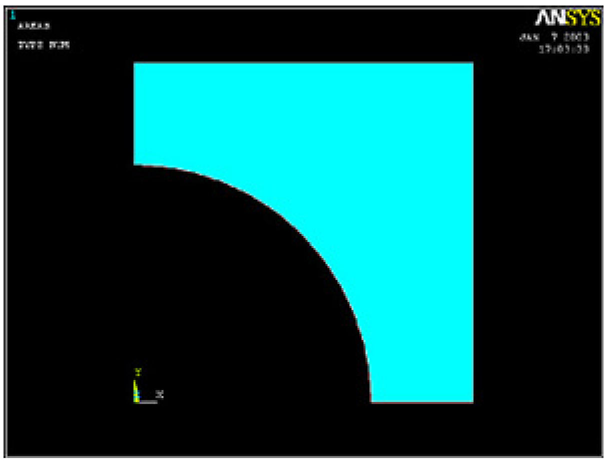
In the *Input* window, ANSYS tells you to "pick or enter base areas from which to subtract". So we pick the square area as follows: Hold down the left mouse button, move the cursor over the areas until the square is selected (it will change color) and release the left mouse button. Click ***OK***.



In the *Input* window, ANSYS now tells you to "pick or enter areas to be subtracted". So select the circular sector by holding down and releasing the left mouse button. Click ***OK***.



If you did this correctly, you will see that the circular sector has been subtracted out from the square area.



You can also select areas during the Boolean subtract operation by simply clicking on them but it becomes difficult to select areas (and other components) in this fashion in more complicated geometries. That's why I made you use the "holding-down-the-mouse-and-releasing" technique.

If you picked an area incorrectly, you can unpick it by clicking the right mouse button and selecting the area. The cursor changes to a downward arrow during an unpick operation. Right-click to return to pick mode.

Save Your Work

Toolbar > SAVE_DB

Go to Step 5: Mesh geometry

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