**Strain Transformation - Worksheet**

1. Analyze the normal strains and shear strains for each square:
   1. What is the normal strain in the “x” direction, εx, for square number two (show calculations)?
   2. What is the normal strain in the “y” direction, εy, for square number two (show calculations)?
   3. What is the shear strain, γxy, for square number two (show calculations)?
   4. What are the in-plane principal strains, ε1 and ε2, for square number two (show calculations)?
   5. What is the maximum in-plane shear strain, γmax, for square number two (show calculations)?
   6. What is the in-plain principal direction, θp, for square number two (show calculations)?
   7. Do the same for each the other squares and summarize your results by filling out the following table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Square # | θ | εx | εy | γxy | ε1 | ε2 | γmax | θp |
| 1 |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |  |

1. Analyze the results and make the following comparisons:
   1. Compare ε1 and ε2 values among the four squares using % difference. Report the largest and smallest % differences (show calculations).What do you observe?
   2. Compare γmax values among the four squares using % difference. Report the largest and smallest % differences (show calculations). What do you observe?
   3. Compare θ and θp for each square by filling out the following table. What do you observe?

|  |  |  |  |
| --- | --- | --- | --- |
| Square # | θ | θp | % Difference |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |

* 1. Compare εx and εy to ε1 and ε2 for square 1. What do you observe?
  2. Compare γxy to γmax for square 4. What do you observe?
  3. Do the observations above make sense? Are there any out of place data points? If so, why?

1. After the analysis be sure to back up your results by completing the following tasks:
   1. Attach the Lab Data Sheet completed in full to the end of this worksheet.
   2. Attach the deformed transparency sheet.