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Speckle Interferometry of Close Visual Binary Star Systems
DARIN MUMMA, Grove City College — Roughly two-thirds of all stars in the observable universe are binary stars. Among these, close visual binary systems are those binaries whose apparent angular separation is between 1 and 10 arcseconds. Previously, these systems could only be analyzed with ordinary optical techniques that require large (3 meters or more) telescopes to resolve. This requirement has placed visual binary observations well out of reach of independent observatories, and interest in other fields cause the largest telescopes to overlook these stars. Thus, disregarded by independent and international astronomers alike, a plethora of these stars are waiting to be discovered and characterized. In this project, we intend to apply speckle interferometry, together with Fourier Analysis, to better resolve these stars. Although speckle interferometry has been used with interferometric binaries (0.2–0.3 arcsecond separation) with great success, we seek to apply this method to visual binaries in order to create a low-cost, standardized process that will be accessible to future research students−even those just entering astronomy research. Early results demonstrate that we can successfully resolve stars to within 4 arcseconds, with improvement achievable by using a red filter, greater magnification, and a shorter exposure time for our camera. We intend to implement these features to improve our camera's calibration and, separately, to expand the functionality of our binary catalogue data retrieval program.

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