



A PARFOCALITY MEASUREMENT METHOD OF A CONTINUOUS ZOOM STEREO MICROSCOPE

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Abstract- To satisfy the demands of the continuous zoom stereo microscope, a parfocality measurement method is proposed. First, the mechanical parameters of the focusing system are estimated by testing the highest and the lowest displacements of the lens group and the rotation angle of the knob simultaneously. Second, by analyzing images captured under different zoom rates, the relatively sharpest displacement under a specified zoom rate is obtained according to the values of the four definition functions, including the variance function, the gradient square function, the discrete Fourier transform function and the Walsh-Hadamard transform function. Then, an in-focus model is presented and implemented to determine whether or not the relatively sharpest displacement under a specified zoom rate is an in-focus displacement, and to obtain the discrete in-focus displacements under multi-rates. Finally, by using discrete in-focus displacements, a continuous zoom in-focus curve is fitted. Results from the experiments show that

the proposed method can accurately and effectively measure the parfocality of a continuous zoom stereo microscope.

Index terms: Continuous zoom, stereo microscope, parfocality, definition function, in-focus model.