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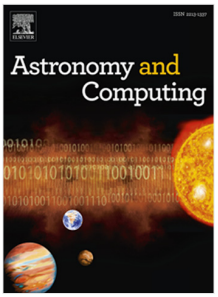

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Estimation of Exoplanetary Planet-to-Star Radius Ratio with Homomorphic Processing

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Abstract

In this paper a homomorphic filtering scheme is proposed to improve the estimation of the planet/star radius ratio in astronomical transit signals. The idea is to reduce the effect of the short-term earth atmosphere variations. A two-step method is presented to compute the parameters of the transit curve from both the unfiltered and filtered data. A Monte Carlo analysis is performed by using correlated and uncorrelated noise to determine the parameters of the proposed FFT filter. The method is tested with observations of WASP-19b and WASP-17b obtained with the FORS2 instrument at the Very Large Telescope (VLT). The multi parametric fitting and the associated errors are obtained with the JKTEBOP software. The results with the white light of the exo-planet data mentioned above suggest that the homomorphic filtering can lead to substantial relative reductions in the error bars as high as 45.5% and 76.9%, respectively. The achieved reductions in the averaged error bars per channel were 48.4% with WASP-19b and 63.6% with WASP-17b. Open source MATLAB code to run the method proposed here can be downloaded from `http://www.cmrsp.cl`. This code was used to obtain the results presented in this paper.

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