

STELLAR PARAMETER ESTIMATION AND FREQUENCY ANALYSIS OF KIC 11973705

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Delta (δ) Scuti stars are a class of pulsating variables located within the classical instability strip on the Hertzsprung-Russell diagram. These stars exhibit a complex internal structure, comprising a mixture of both radial and non-radial pressure modes oscillations. KIC 11973705 is a double mode pulsating star, observed in photometry at Quarter 9 by Kepler mission. However, the lack of observational constraints for KIC 11973705 target has limited the comprehensive study of stellar parameters. To overcome this issue, the study delivers a theoretical approach for the estimation of stellar parameters for KIC 11973705 with minimal observational inputs. The effective temperature (T_{eff}) and surface gravity ($\log g$) were adopted from the literature. In addition, visual (V) band magnitude and parallax were obtained for the estimation of stellar parameters through established theoretical approaches, which mainly include the dustmaps python package, the distance modulus formula, the Stefan-Boltzmann law, relationship to the surface gravity, and the polynomial transformation equations. The absolute magnitude of V band, $M_V = 2.83 \pm 0.02$ mag; Bolometric Correction, $BC_V = 0.0348 \pm 0.0015$ mag; $B-V$ color index = 0.2641 mag; and Bolometric Magnitude $M_{\text{bol}} = 2.86 \pm 0.02$ mag were the newly estimated parameters for the KIC 11973705. In addition, a detailed frequency analysis was performed to identify the pulsation characteristics using Period04 software. The dominant fundamental frequency was found to be $2.9002 \pm 0.0005 \text{ d}^{-1}$ and derived minimum p mode threshold frequency for the KIC 11973705 was 2.1095 d^{-1} . In summary, this study yields an estimation of new stellar parameters for the first time for KIC 11973705.

Keywords: Delta scuti star, Frequency analysis, Fundamental frequency, Polynomial transformation, Stellar parameters