

Haider Hussein Hamad. Dynamic Response of Solar Concentrating Power system for self cleaning. University of Technology. Mechanical Engineering Department. Ph.D. supervisor: Mauwafak. Ali. Tawfik and Bahaa. Ibrahim. Kazem
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Abstract

In this study, the dust removal concept for the solar polar concentrating power system is investigated. The study was focused on the investigation of vibrational dust removal technique for the parabolic trough solar collector. To develop the vibrational dust removal concept, a comprehensive investigation for the vibrational characteristics of the parabolic trough is done. This investigation included the evaluation of natural frequencies, mode shape, damping ratios, the dynamic response due to harmonic excitation and wind loading. Also, the flow field characteristics around the parabolic trough are investigated, including the wind loading, pressure and velocity distributions and turbulence intensity over the parabolic trough. All the above parameters were evaluated numerically and experimentally. The experimental setup included the experimental modal analysis tests to specify vibrational characteristics and wind loading measurements to specify the flow field characteristics. The prototype of parabolic trough was made for this purpose. Fiberglass composite was used in manufacturing of the prototype and the mechanical tests were done to specify the mechanical properties of the material.

Keywords:

Solar energy, parabolic trough, dust removal, vibration characteristics, wind loading.