

Role of Moiré Fringe Topography and Rasterstereography in the Management of Back Pain

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Back pain causes reduction in the quality and the quantity of work done by an employee, a housewife or a student. There is a need for non-contact and non-invasive techniques for monitoring causes of back pain, so that efficient and effective management strategies could be initiated. Moiré fringe topography and rasterstereography are photogrammetric techniques, which provide 3-D information in terms of height and curvature maps of the study surface (Figures 1 and 2), the human back in case of back pain, the human shoulder in case of frozen shoulder, *etc.* These techniques do not involve ionizing radiations, *e.g.*, X rays, and, hence, ideal for monitoring spinal curvatures in children. The author developed methods to determine Cobb angle from measurements performed on moiré topographs (and its generalization in 3-D, the Asr Angle). In the context of 3-D-static model of the human spinal column (put forward by author in 1982, complete version published in 1996), profile of spinal column in three dimensions was generated by moiré photograph of back, used to study posture, providing insight into the anatomical basis of back pain. A simultaneous recording from moiré and raster gave height and curvature maps of spinal column (thus generating 3-D profile of spinal column) in each phase of human gait (developed in 1996). A 3-D-dynamic model related spinal column in each phase to the next through edge-based algorithm. Edge-based moiré and edge-based raster allowed study of changes in height and curvature maps of human back during a gait cycle, thus providing clues to the physiological basis of back pain.



Fig. 1a, b. Studies of (a) human back using moiré fringe topography (photo credit: Shakeel Ahmed Ansari) and (b) human shoulder using rasterstereography (photo credit: Majeed Ahmed Khan)

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