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DYNAMIC CONCRETE BEAM DEFORMATION MEASUREMENT USING RANGE CAMERA

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Abstract. Concrete beams are used to construct bridges and other structures. During the decaying state of structures, deformation of bridges or other structures occurs frequently. To measure concrete beam deformation, as integral components of structures, is well researched. Such as digital cameras, laser scanners and range cameras have been proven to be effective for large-area measurement of deformation under static loading conditions. However, for monitoring real-time bridge deformation, the measurement accuracy under dynamic loading conditions is also necessary. This paper presents a relatively simple technique to measure the deformation of concrete beams in response to dynamic loading. Due to the range camera measurement principle, target movement could lead to measurement accuracy degradation. The results of simulated and real-data investigation into the effect of lower sampling frequency leads to the more significant motion artefact. The results indicated that periodic deformation can be recovered with sub-millimetre accuracy if target motion is sampled at a rate of least 20 Hz and with 31 MHz range camera modulation frequency is 29 MHz, the best sampling frequency is 20 Hz to keep

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