Effects of time lag

If the A/D board has a time lag Δt between the recorded stress and strain data, it will induce an apparent damping ratio Δh during cyclic loading. For example, during sinusoidal wave loading at a frequency of f, the measured damping ratio when strain is measured behind stress will apparently increase by $\Delta h = \sin(2\pi f \Delta t)/2$.

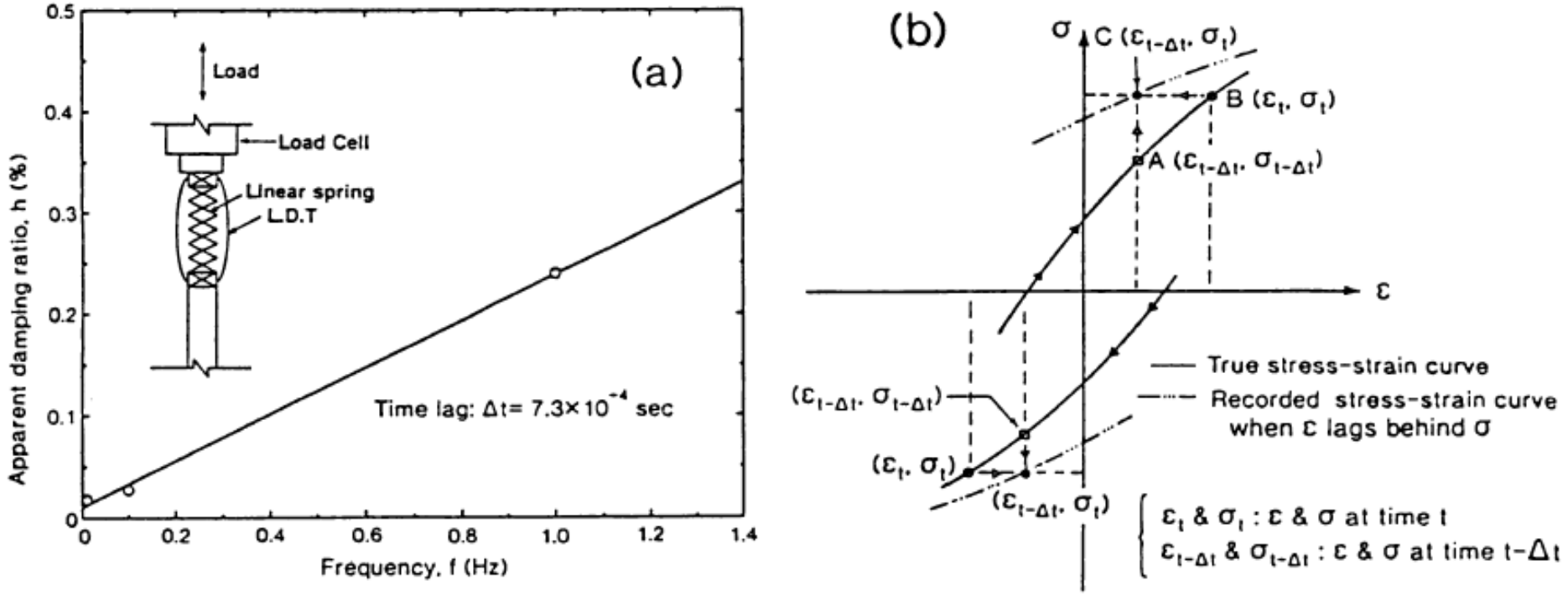

Fig. (a) Effect of time lag on damping measurements and
(b) stress strain relation when strain is measured behind stress (after Tatsuoka et al., 1994)

Ref: F. Tatsuoka, S. Teachavorasinskun, J. Dong, Y. Kohata & T. Sato, Importance of measuring local strains in cyclic triaxial tests on granular materials Dynamic geotechnical testng II, ASTM, STP 1213, 288-302, 1994.