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Mechanical anisotropy of viscoelasticity in biological cells MING-TZO WEI, H.D. OU-YANG, Lehigh University — The mechanism that biological cells use to remodel their cytoskeletal structure in response to external stress is unclear. Experimental observations suggest that the cells remodel their skeleton in a manner that is directionally responsive to the external stress. In order to understand these directional responses, we developed a method to measure the rheological response of the cell in orthogonal directions simultaneously. To achieve controlled stimulation and detection, we used a dual-beam optical tweezer, which used a pump and probe scheme to measure the storage and loss modulus of the cellular cytoskeleton. The pump was used to manipulate extracelluar micro-particles which were attached to the actin cytoskeleton through trans-membrane integrin alpha receptors. By measuring two independent regions of the cell, we were able to generate a localized mechanical stress on the outer surface of the cell while observing the directionally specific inside response.

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