

# The derivation of the relationship between the electrical current and the applied stress for cortical bone

by

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## **Abstract**

Bone poroelasticity is widely used for elucidating the bone fluid flow stimulating bone cells and these bone cells communicate each other. Bone cells are stimulated by the strain generated potentials, which are induced by either bone fluid flow or piezoelectricity. We derive the equation by combining the electokinetic equation of bone fluid flow with the piezoelectric equation, and the electrical current induced by piezoelectricity is obtained for the case when the bone fluid flow is absent. Also this equation is combined with the wave propagation so that we can estimate the bone remodeling effect with the wave propagation.