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Andrew William Wharmby* (awharmby@gmail.com) and **Ronald Laird Bagley**. *Modifying Maxwell's equations for dielectric materials based on techniques from viscoelasticity and concepts from fractional calculus.*

A mathematical model of viscoelasticity employing fractional order derivatives is adapted and applied to model the dielectric behavior of materials while remaining consistent with thermodynamic principles. The model is then incorporated into Maxwell's equations using techniques from viscoelasticity. The modified Maxwell's equations are found to yield a fractional order wave equation that is solved analytically and is found to remain consistent with dissipative and dispersive phenomena. (Received January 09, 2015)