



## Title(2): Power laws in cytoskeleton microrheology: creep function, viscoelastic modulus and modelization

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**Abstract (2):** Two microrheological experiments were performed on the cytoskeleton of single cells. In the first one, the creep function  $J(t)$  of an entire cell stretched between two glass microplates is measured after applying a constant force step. In the second one, a micrometric bead specifically bound to integrins is driven by an optical trap oscillating at frequency  $f$ , and the viscoelastic coefficient  $G_e(f)$  is retrieved. Both  $J(t)$  and  $G_e(f)$  exhibit power law behaviours:  $J(t) = At^\alpha$  and  $|G_e(f)| = G_0 f^{-\alpha}$ , with the same exponent  $\alpha \approx 0.20$ . A comparative synthesis with other results in the literature show that this behaviour is very robust, since  $\alpha$  does not significantly depend on the cell type, on the nature of the complex transmitting the mechanical stress, on the probe scale, nor on the microrheological technique. We have modelized this generic behaviour by assuming that the elementary mechanical units in the cell are distributed in a self-similar way. Consequently, the power law distributions in size and in dissipation time  $\tau$  are widely spread, and lead to power law behaviour for the mechanical answer. The natural dispersity from one cell to the other is simulated by randomly selecting a set of relaxation times  $\tau_i$  from the ideal distribution. This model accurately predicts the behaviours of  $J(t)$  and  $G_e(f)$  and the statistical distribution of the parameters  $A$  and  $G_0$ , in agreement with experiments.



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