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Detrapping Particles in a Gel : A Numerical Study ANTOINE DUBÉ, FRANCIS TORRES, GARY W. SLATER, University of Ottawa — Pulsed fields are widely used in gel electrophoretic separations to increase resolution. For instance, Boyde & To [1] presented experimental results for the separation of spherical particles using pulsed fields. They first used alternating fields of fixed amplitudes ($E_{\pm} = \pm |E|$) applied in the forward direction for a duration twice as long as in the backward direction. They then used field interruption in order to allow particles to thermally detrap. In both cases, they reported that using a pulsed field makes the particles migrate faster. We model the gel used in electrophoresis as a 2D system of obstacles on a lattice. We use a method that allows us to calculate the exact mean velocity of a particle for Monte-Carlo simulations to first reproduce the experimental results presented above. We then investigate different signals (e.g., telegraph signal) to determine the optimal conditions. Optimal conditions can be either higher velocities or larger velocity differences between particles.

[1] *Pulsed-field acceleration: The electrophoretic behavior of large spherical particles in agarose gels*, Electrophoresis, 1993.

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