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Continuous and Discontinuous Traveling Waves in a Hyperbolic Keller-Segel Equation.

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Abstract

We describe a hyperbolic model with cell-cell repulsion with a dynamics in the population of cells. More precisely, we consider a population of cells producing a field (which we call *pressure*) which induces a motion of the cells following the opposite of the gradient. The field indicates the local density of population and we assume that cells try to avoid crowded areas and prefer locally empty spaces which are far away from the carrying capacity. We describe the traveling wave solutions for this equation and in particular the sharp traveling waves that are identically zero after some point in space; we show that these waves are necessarily discontinuous and give an estimate of their speed. We also construct continuous traveling waves which have a speed that is strictly greater than the one of the sharp waves. Finally, we investigate the behavior of a related model with diffusion and show that the behavior of the vanishing viscosity solutions is consistent with the limit equation.

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