A Gamma convergence approach to a sharp-interface limit of a phase transition problem, with application to a tumor growth model

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We consider an approximate two-phases model for tumor growth, consisting in a forth order system of PDEs involving a Cahn-Hilliard type equation. We are interested in the sharp interface limit, that is the limit of the solutions as the approximating parameter tends to zero. Benefiting of a gradient flow structure, we employ a technique introduced by Sandier and Serfaty, known as Γ-convergence for gradient flows, allowing us to prove that the solutions tends to a solution of a free-boundary problem. The free boundary evolution can be described and is shown to be very similar to the limit of the Cahn-Hilliard equation solutions.

References

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