The heat flow for surfaces of prescribed mean curvature: Existence and regularity

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We consider the heat flow associated to the system for surfaces of prescribed mean curvature, more precisely

$$\frac{\partial u}{\partial t} - \Delta u = -2(H \circ u)\frac{\partial u}{\partial x} \times \frac{\partial u}{\partial y} \quad \text{in } B \times (0, \infty),$$

for a given function $H\colon \mathbb{R}^3 \to \mathbb{R}$. Imposing an isoperimetric condition on the prescribed mean curvature function H, we employ the method of minimal movements to construct a weak solution of the Cauchy-Dirichlet problem. The solution exists for all times and sub-converges to a solution of the stationary problem as time tends to infinity. Moreover, we show that the solution can be constructed in such a way that it develops singularities at most at finitely many times. All results were established in joint works with Verena Bögelein (Erlangen) and Christoph Scheven (Duisburg-Essen).