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Ancient solution to the generalized curve shortening flow

We prove some estimates for convex ancient solutions (the existence time for the solution starts from $-\infty$) to the generalized curve shortening flow (convex curve evolving in its normal direction with speed equal to a power of its curvature, the power is assumed to be bigger than $\frac{1}{2}$). As an application, we show that, if the convex compact ancient solution sweeps the whole space \mathbf{R}^2 , it must be a shrinking circle. By exploiting the affine invariance of the affine curve shortening flow (when the power equals to $\frac{1}{3}$), we are also able to show that the only convex compact ancient solution must be a shrinking ellipse.