

Heat conductors with a stationary hot spot

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We consider a convex heat conductor having initial constant temperature and zero boundary temperature at every time. The hot spot is the point in the conductor at which temperature attains its maximum at each given time; if the conductor is convex, then there is only one hot spot.

In a (submitted) joint paper, S. Sakaguchi and I have considered convex conductors with a stationary hot spot, that is a hot spot that does not move in time. A state-of-the-art sufficient condition for a stationary hot spot was given by M. Chamberland and D. Siegel, who proved that, if a conductor is invariant under an essential group of orthogonal transformations, then its hot spot does not move in time.

No necessary condition has been given so far. In my talk, I will show that, if the hot spot is stationary, then the boundary of the conductor satisfies a certain geometric condition. Such a condition implies that, among all triangles, only the equilateral one has the hot spot that does not move and, among all convex quadrangles, only the parallelograms have a stationary hot spot.