

# Two-phase conductors and overdetermined problems with transmission conditions

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We consider a two-phase heat conductor in  $\mathbb{R}^N$  with  $N \geq 2$  consisting of a core and a shell with different constant conductivities. This kind of two-phase electrical conductor has been dealt with in [KLS] in the study of neutrally coated inclusions. Suppose that, initially, the conductor has temperature 0 and, at all times, its boundary is kept at temperature 1. It is shown in [S] that, if there is a stationary isothermic surface in the shell near the boundary, then the structure of the conductor must be spherical. Moreover, when the medium outside the two-phase conductor has a possibly different conductivity, we consider the Cauchy problem with  $N \geq 3$  and the initial condition where the conductor has temperature 0 and the outside medium has temperature 1. Then we show that almost the same proposition holds true.

## References

- [KLS] H. Kang, H. Lee, and S. Sakaguchi, An over-determined boundary value problem arising from neutrally coated inclusions in three dimensions, *Annali della Scuola Normale Superiore di Pisa, Classe di Scienze*, in press.
- [S] S. Sakaguchi, Two-phase heat conductors with a stationary isothermic surface, *Rendiconti dell'Istituto di Matematica dell'Università di Trieste*, in press.