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Mark A Allen* (allenma@math.purdue.edu). *Separation of a Lower Dimensional Free Boundary in a Two Phase Problem.*

The author studies the two phase problem of a free boundary problem involving the fractional laplacian. This is a non-local analogue of a classical free boundary problem. The main result states that the two free boundaries of the positive and negative phases cannot touch. As a corollary, locally the free boundary problem reduces to a one phase problem. This result is in complete contrast to the classical free boundary problem where the two phases can touch. (Received September 21, 2012)