

1067-76-1846

Sadia M.. Makky* (sadia_makky@owens.edu), 18547 Clairmont circle E, Northville, MI 48168, and **ALI M. Ghalib** and **Thaer S. Sliby**. *Thermal and mass flow in uniform stream with a sink and a heat source via variational technique for free boundary problems.*

A stream with parallel sides, moving with uniform speed and with constant temperature is considered. Stream water at a certain location is taken continuously (sink) as coolant; the heated water is dumped back to the stream at a further location along the stream flow direction (source). The problem is to find the minimum distance between the source and sink that insures the stability of water temperature; in the sense that sink water temperature does not increase.

The problem is solved as a free boundary problem by two methods, finite elements, and variational techniques. Both methods give almost identical results, thus indicating the validity of both. Only variational approach is discussed in this article. (Received September 22, 2010)