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# An approximate treatment of a heat conduction problem involving a two-dimensional solidification front

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### Abstract

The approximate integral-methods of boundary layer theory in fluid dynamics are used to obtain information on a heat conduction problem involving a moving two-dimensional solidification front. The example treated is the inward solidification of a uniform prism having square crosssection and filled with liquid initially at the fusion temperature. The results obtained for the location and time history of the front are in good agreement with those found by Alien and Severn [1] using the relaxation method.

Résumé

Les méthodes intégrales approchées de la théorie de la couche limite en dynamique des fluides sont utilisées pour étudier un problème de conduction thermique avec déplacement d'un front de solidification bi-dimensionnel. L'exemple

thermique avec un déplacement d'un front de solidification de dimensionnel. L'exemple traitÃ© est celui de la solidification Ã l'intÃ©rieur d'un prisme uniforme Ã section carrÃ©e rempli d'un liquide initialement Ã la tempÃ©rature de fusion. Les rÃ©sultats obtenus quant Ã la position et Ã l'Ã©volution dans le temps du front de solidification sont en bon accord avec ceux trouvÃ©s par Allen et Severn [1] en utilisant la mÃ©thode de relaxation.

## Zusammenfassung

Das Problem der WÃ¤rmeleitung in einer fortschreitenden, zweidimensionalen Verfestigungsfront wird mit Hilfe angenÃ¤herter Integralmethoden der hydrodynamischen Grenzschichttheorie untersucht. Als Beispiel dient die von aussen nach innen fortschreitende Verfestigung in einem WÃ¼rfel, der anfÃ¤nglich mit FlÃ¼ssigkeit von Schmelztemperatur gefÃ¼llt war. Die Ergebnisse fÃ¼r die Ort- und ZeitabhÃ¤ngigkeit der Front sind in guter Ãbereinstimmung mit jenen, die Allen und Severn [1] nach der Relaxationsmethode gefunden haben.



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