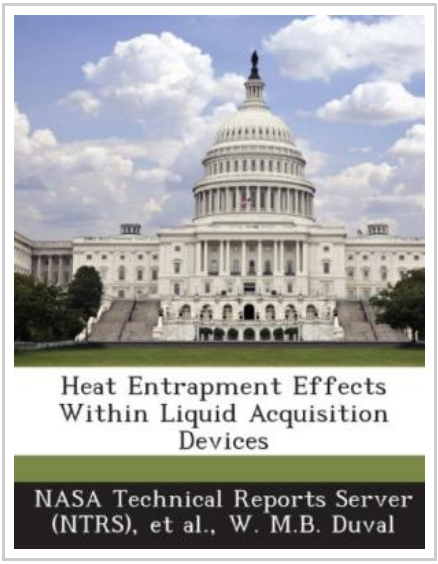




# Heat Entrapment Effects Within Liquid Acquisition Devices

By W. M. B. Duval

BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 40 pages. Dimensions: 9.7in. x 7.4in. x 0.1in.We introduce a model problem to address heat entrapment effects or the local accumulation of thermal energy within liquid acquisition devices. We show that the parametric space consists of six parameters, namely the Rayleigh and Prandtl numbers, the aspect ratio, and heat flux ratios for the bottom, side, and top boundaries of the enclosure. For the range of Ra considered 1 to 10(sup 9), beyond Ra on the order of 10(sup 5), convective instability is the dominant mode of convection in comparison to natural convection. The flow field transitions to asymmetric modes at Ra on the order of 10(sup 7). Direct numerical simulation of a large geometric length scale prototype for Ra on the order of 10(sup 9) shows that the flow field evolves from small wavelength instability which gives rise to nonlinear growth of thermals, propagation of the instability occurs via growth of secondary and tertiary modes, and a travelling wave mode occurs prior to asymmetry. The effect of a large aspect ratio is to increase the number of modes in the vertical direction. Due to the slow diffusion of...



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