URN etd-0407109-183725-2056
Author Ching-Lun Huang
Author's Email Address No Public.
Statistics This thesis had been viewed 50 times. Download 0 times.
Department
Year 2004
Semester 1
Degree Master
Type of Document Master's Thesis
Language zh-TW.Big5 Chinese
Title Investigation of Flow Field for Air Flow across Inclined Tube Banks in Staggered Arrangements
Date of Defense 0000-00-00
Page Count 91

Keyword
Inclined tube banks
Staggered arrangement
Cross flow
DPIV

Abstract
The flow field phenomenon of air flow across tube banks, sixty degree inclined toward horizon, in staggered arrangements was investigated. This configuration was commonly used in air-cooled steam condenser. The flow characteristics such as velocity distribution and pressure drop of interstitial flow and downstream flow in tube banks, for different rows of tubes and transverse pitch, were studied in order to obtain more design information.
The main works were：(I) By distorted model technique, the geometric test model was five times reduced from real condenser, however the inlet air velocity was the same as real situation at 3m/sec, such that the upstream Reynolds number （Re） in the test model was 900. Using digital particle image velocimetry (DPIV), the velocity distribution were measured over the downstream flow in tube banks with different rows of tubes in the test model. (II) Computational fluid dynamics software, FLUENT, was used to compare the results obtained from previous DPIV measurement. (III) The interstitial flow field and pressure drop in tube banks was simulated by FLUENT over the two-dimensional computational domain, which had elliptic cross section, ratio of long-axis (B) to short-axis (A) was 2, represented the projection of inclined tube banks, with rows of tubes （N） between 1 to 3 and ratios of transverse-pitch to long axis-of-elliptic-cross-section （ST/B） between 0.8 to 1.6. （IV） Software CFDRC was also used to compare the results obtained from FLUENT. Measurement results of DPIV in test model showed the velocity downstream of tube banks was inverse proportional with the rows of tube banks, which had similar trend with those obtained from FLUENT. Software simulation showed the following results for the interstitial flow field and pressure drop in tube banks. (1) The maximum velocity occurred at the gap between tubes, and ST/B was inverse proportional to the value of maximum velocity. While N=1, with ST/B reducing from 1.6 to 0.8, the value of maximum velocity was increased accordingly with small slope; however with ST/B keep reducing from 0.8, the value of maximum velocity was sharply increased. While N=2 and 3, with ST/B reducing from 1.6 to 1.0, the value of maximum velocity was slowly increased, as ST/B keep reducing from 1.0, the value of maximum velocity, appeared at A2, was sharply increased. (2) The wakes behind the tube banks were more obviously interacted with each other from reducing the ST/B. （3） The pressure drop between inlet and outlet of tube banks was increasing with reducing ST/B or N. While N=1, with ST/B reducing from 1.6 to 0.8, the value of pressure drop was increasing slowly, however with ST/B keep reducing from 0.8, the pressure drop was

sharply increased. While N=2 and 3, with ST/B reducing from 1.6 to 1.0, the pressure drop was slowly increased, as ST/B keep reducing from 1.0 the pressure drop was sharply increased. （4）The results obtained from FLUENT and CFDRC were similar to each other.
Keywords: Inclined tube banks, Staggered arrangement, Cross flow, DPIV
Advisory Committee - advisor

Files No Any Full Text File.
Date of Submission 2005-01-01