Toward calculation of free-convective motion of liquid over a linear heat source

O. G. Martynenko &

V. N. Korovkin

Abstract

The results of an analytical and numerical investigation of a laminar free-convective motion of liquid over a linear heat source are presented. The characteristic features of velocity and temperature field as functions of the density parameter and Prandtl number have been studied. A table of numerical solutions is given.

This is a preview of subscription content, access via your institution.

References

1. J. C. Mollendorf, R. S. Johnson, and B. Gebhart, Several plume flows in pure and saline water at its density extremum, *J. Fluid Mech.*, 113, 269–282 (1981).

   MATH Article Google Scholar

2. Y. Joshi and B. Gebhart, An experimental study of plane plumes in cold water, *Trans ASME. J. Heat Transfer*, 105,No. 2, 248–254 (1983).

   Article Google Scholar

3. Y. Joshi and B. Gebhart, Vertical transient natural convection flows in cold water, *Int. J. Heat Mass Transfer*, 27,No. 9, 1573–1582 (1984).

   Article Google Scholar

4. O. G. Martynenko, V. N. Korovkin, and Yu. A. Sokovishin, A laminar swirled free-convection jet, *Int. J. Heat Mass Transfer*, 28,No. 2, 371–382 (1985).

   MATH Article Google Scholar

5. V. N. Korovkin and A. P. Andrievskii, Free convection with a nonlinear dependence of density on temperature: plane problems, *Inzh.-Fiz. Zh.*, 73,No. 2, 381–386 (2000).

   Google Scholar

6. L. J. Crane, Thermal convection from a horizontal wire, *ZAMP*, 10,No. 5, 453–460 (1959).

MATH Article MathSciNet Google Scholar

7. T. Fujii, Theory of the steady laminar natural convection above a horizontal line heat source and point heat source, *Int. J. Heat Mass Transfer*, 6,No. 7, 597–606 (1963).

Article Google Scholar

8. V. N. Korovkin and S. L. Semin, Mixed convection in laminar vertical jets, *Vestsi Akad. Navuk BSSR, Ser. Fiz.-Energ. Navuk*, No. 2, 77–83 (1986).
9. O. G. Martynenko, V. N. Korovkin, and Yu. A. Sokovishin, *Theory of Buoyant Jets and Wakes* [in Russian], Nauka i Tekhnika, Minsk (1991).

Google Scholar

Download references

Author information

Affiliations

1. A. V. Luikov Heat and Mass Transfer Institute, National Academy of Sciences of Belarus, 15 P. Brovka Str., Minsk, 220072, Belarus
   O. G. Martynenko & V. N. Korovkin

Additional information

_____

Rights and permissions

Reprints and Permissions

About this article

Cite this article

Download citation

Laminar Natural Convection
Line Heat Source