

热力学

电磁流体中火用的传递和转换特性

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收稿日期 2007-2-7 修回日期 2007-8-6 网络版发布日期 2007-12-26 接受日期

摘要

审视了多组分黏性电磁流体(包含热传输、对流、电磁能传输、质量传输和化学反应过程)的动量传递方程、质量传递方程、能量传递方程,重新构建了电磁流体的熵传递方程。通过定义热火用、压火用、化学火用、动能火用、势能火用、电磁火用,重新构建了不同形式火用传递的分量方程及其总火用传递方程。通过分解这些传递方程,揭示了不同形式火用之间可逆与不可逆的传递和转换关系,为理解不可逆传递过程的机制、正确计算不可逆性的火用损及其改善电磁流体传递过程的性能和用能效率提供了有效的途径。

关键词

[电磁流体](#) [能量传递](#) [火用传递](#) [火用损](#)

分类号

Transfer and inter-conversions between different forms of exergy in electromagnetic fluids

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Abstract

The mass, momentum, energy transfer equations of a multi-component electromagnetic fluid were reviewed subject to viscous processes, heat transfer by conduction, radiation, and convection, electromagnetic energy transfer, matter diffusion and chemical reactions. These transfer equations were used to reestablish the entropy transfer equation for the electromagnetic fluid, and further to reconstitute the differential component equations for different forms of exergy and the differential equation for total exergy in the fluid by the definitions of thermal, pressure, chemical, kinetic, potential and electromagnetic forms of exergy. These component equations revealed the relations of transfer and inter-conversions between the different forms of exergy, including the breakdown into reversible and irreversible conversions, which provided an approach to comprehending the irreversible exergy transfer mechanism, to calculating correctly the exergy destruction due to reversibility, and to improving the efficiency and performance of electromagnetic fluid transfer process.

Key words

[electromagnetic fluids](#) [energy transfer](#) [exergy transfer](#) [exergy destruction](#)

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