

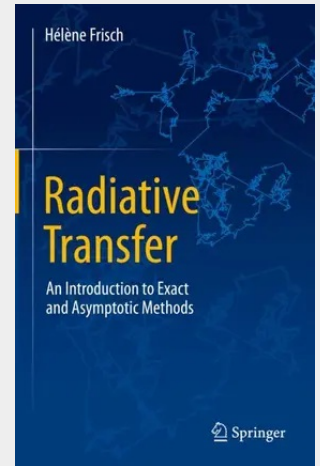
Radiative Transfer

An Introduction to Exact and Asymptotic Methods

This book discusses analytic and asymptotic methods relevant to radiative transfer in dilute media, such as stellar and planetary atmospheres. Several methods, providing exact expressions for the radiation field in a semi-infinite atmosphere, are described in detail and applied to unpolarized and polarized continuous spectra and spectral lines. Among these methods, the Wiener–Hopf method, introduced in 1931 for a stellar atmospheric problem, is used today in fields such as solid mechanics, diffraction theory, or mathematical finance. Asymptotic analyses are carried out on unpolarized and polarized radiative transfer equations and on a discrete time random walk. Applicable when photons undergo a large number of scatterings, they provide criteria to distinguish between large-scale diffusive and non-diffusive behaviors, typical scales of variation of the radiation field, such as the thermalization length, and specific descriptions for regions close and far from boundaries.

Its well organized synthetic view of exact and asymptotic methods of radiative transfer makes this book a valuable resource for both graduate students and professional scientists in astrophysics and beyond.

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