APPLICATION OF COMPOSITION PDF METHODS IN THE INVESTIGATION OF TURBULENCE-RADIATION INTERACTIONS

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ABSTRACT. The composition probability density function (PDF) method is used to study radiating reactive flows. The method is able to treat turbulence-radiation interactions in a rigorous way: many unclosed terms due to turbulence-radiation interactions in the traditional Reynolds-averaging process can be calculated exactly and all others can be accurately modeled by using the optically thin eddy approximation. The application of the method is demonstrated by considering a simplified methane/air diffusion flame, which shows enhancement of the radiative fluxes as a result of turbulence-radiation interactions. The importance of considering different turbulence-radiation interaction terms is investigated, indicating that the absorption coefficient-Planck function correlation is the most important.