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DEVELOPMENT OF A NEW MODEL TO ACCOUNT FOR TURBULENCE-RADIATION INTERACTION IN THE RADIATIVE EMISSION

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ABSTRACT. A new model is proposed to account for turbulence-radiation interaction effects on the radiative emission in the framework of Reynolds-Averaged Navier-Stokes simulations. The temperature *T* and the absorption coefficient _ in the mean radiative emission are decomposed into mean and fluctuating components and the resulting correlations are grouped into terms. The importance of each term is assessed using data generated from high-resolution, large eddy simulations of large-scale pool fires, and all higher-order terms are related through curve fittings with quantities for which models are already available. With quadratic expressions, the mean radiative emission could be predicted with an average error of less than 20%. An improved model for the _-T correlation is also developed from a multi-variable Taylor series representation of the absorption coefficient; the error associated to this approximation is one order of magnitude smaller than the one obtained by a previous model.