AbstractID: 1569 Title: Application of the energy-dependent proton loss model (PLM) to heterogeneous slab media

Proton radiotherapy has superior dose localization compared to photon or electron radiotherapy. For treatment planning in a busy clinic, an accurate dose engine with low calculation cost is necessary for optimizing this superior proton dose localization. We present the application of the analytic energy-dependent proton loss model (PLM) to compute dose in heterogeneous media using examples of mixed slab structures of water, bone and lung. The one free parameter, χ, in the model must be determined as a function of beam energy, atomic number and mass density of the scattering medium. Results indicate that parameter χ depends on Z_{eff} and ρ of the bone and lung media but is independent of the proton beam's initial energy. The predictions of the PLM in heterogeneous slab media are compared to benchmark Monte Carlo (GEANT) calculations. All PLM predictions of broad beam depth dose agree within 5% of maximum dose with Monte Carlo calculations over the incident beam energy range 50 MeV to 250 MeV.