TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Wednesday, 17 September 2014, 4:00 p.m.
Room 617 Wachman Hall

(refreshments and social at 3:45 p.m)

Interactive Treatment Planning in Cancer Radiotherapy

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Abstract. The dose-volume histogram (DVH) is a clinically relevant criterion to evaluate the quality of a cancer treatment plan. It is hence desirable to incorporate DVH constraints into treatment plan optimization for intensity modulated radiation therapy. Yet, the direct inclusion of the DVH constraints into a treatment plan optimization model typically leads to great computational difficulties due to the non-convex nature of these constraints. To overcome this critical limitation, we propose a new convex-moment-based optimization approach. Our main idea is to replace the non-convex DVH constraints by a set of convex moment constraints. In turn, the proposed approach is able to generate a Pareto-optimal plan whose DVHs are close to, or if possible even outperform, the desired DVHs. In particular, our experiment on a prostate cancer patient case demonstrates the effectiveness of this approach by employing two and three moment formulations to approximate the desired DVHs.