

## **ADMM for Nonconvex Optimization**

**with an application to EPI-MRI susceptibility artifact correction**

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### **Abstract**

Originally developed in the mid 1970s, the Alternating Direction Method of Multipliers (ADMM) recently received a lot of attention in many data science and imaging applications. Although traditional convergence results for ADMM cover only convex optimization problems there has been an increasing interest in using it also for nonconvex problems.

In this talk we will briefly recall the concept of ADMM, its use when solving regularized inverse problems via variable splitting, and explore some recent convergence results in the nonconvex case.

Finally, we will consider the exemplary problem of susceptibility artifact correction in Echo-planar imaging (EPI), an ultra-fast magnetic resonance imaging (MRI) technique. A carefully chosen discretization leads to an efficient parallelizable ADMM correction method (nonconvex, but with convergence guarantees) that can achieve speedups factors of about 30x over comparable state-of-the-art methods.

*This is joint work with Lars Ruthotto (Emory University).*