1163-05-634 **Mark Bilinski\*** (`mark.bilinski@navy.mil`). *Naval applications of combinatorics.*
The Navy operates in a vast and complex ocean, far from established infrastructure. This brings with it a unique perspective to a number of common military problems – which are an endless font of research opportunities for academics and industry alike. This talk provides an overview of just a small sample of such problems, specifically some that I have studied thusfar while at the Naval Information Warfare Center Pacific that have a combinatorial flavor. First I discuss challenges with communication in what is called a DIL environment (Disconnected, Intermittent, Limited bandwidth). This led to a practical encoding/decoding scheme for synchronizing large datasets in such tactical Navy environments – from a theory perspective the scheme may seem suboptimal, but it more directly addresses practical Naval concerns. Second, I discuss broad concepts in cyber defense and how graph convolutional neural networks and game theory can be used to better understand adversary behavior. Third, I will present 3-D point cloud data of ships and discuss multiple applications stemming from its analysis, such as computer vision, augmented reality, preventative maintenance, and robotics. (Received September 10, 2020)