

## Complexes from complexes

**Douglas Arnold<sup>1</sup>, Kaibo Hu<sup>1</sup>**

<sup>1</sup> University of Minnesota

The finite element exterior calculus has highlighted the importance of Hilbert complexes to partial differential equations and their numerical solution. The most canonical and most extensively studied example is the de Rham complex, which is what is required for application to Darcy flow, Maxwell's equations, the Hodge Laplacian, and numerous problems. But there are many other important differential complexes as well, with applications to elasticity, plates, incompressible flow, general relativity, and other areas. These complexes are less well known and in many cases their properties not established. In this talk I will discuss a systematic procedure for deriving such complexes and deriving their crucial properties, illustrated with numerous examples.