A C^1-CONFORMING ARBITRARY-ORDER TWO-DIMENSIONAL VIRTUAL ELEMENT METHOD FOR THE FOURTH-ORDER PHASE-FIELD EQUATION

GIANMARCO MANZINI, DIBYENDU ADAK, YU LENG, JEEYON N. PLOHR, AND HASHEM MOURAD

ABSTRACT. We present a conforming virtual element method [1] for the two-dimensional High-Order Phase Field (HOPF) equation [2]. This equation is a fourth-order equation and our numerical approximation relies on the design of an arbitrary order accurate, virtual element space with C^1 global regularity. Such regularity is guaranteed by taking the values of the virtual element functions and their full gradient at the mesh vertices as degrees of freedom. High-order accuracy requires also edge polynomial moments of the trace of the virtual element functions and their normal derivatives. A set of representative test cases assess the behavior of the method.

Keywords: High-order Phase-Field (HOPF) model, virtual element method, high-regular conforming method

Mathematics Subject Classifications (2010): 65M12, 65M15, 65M60

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APPLIED MATHEMATICS AND PLASMA PHYSICS, T-5, THEORETICAL DIVISION,, LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NM, USA,
  Email address: gmanzini@lanl.gov

APPLIED MATHEMATICS AND PLASMA PHYSICS, T-5, THEORETICAL DIVISION,, LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NM, USA,
  Email address: dadak@lanl.gov

FLUID DYNAMICS AND SOLID MECHANICS, T-3, THEORETICAL DIVISION,, LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NM, USA
  Email address: yleng@lan.gov

MATERIALS AND PHYSICAL DATA, XCP-5, COMPUTATIONAL PHYSICS DIVISION,, LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NM, USA
  Email address: jplohr@lanl.gov

FLUID DYNAMICS AND SOLID MECHANICS, T-3, THEORETICAL DIVISION,, LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NM, USA
  Email address: mourad@lanl.gov