Boundary Element Method Open Source Software in Matlab

File / Module(s)	l2lc.m/ l2lc
Title	A code for evaluating the discrete Laplace integral operators for two –dimensional problems.
Version(Date) and History	**2.** (September 2015). (Version 1 2008). Changes include quadrature rule is now an input to the function (rather than being internally generated). Verification of the input quadrature rule and geometry is included.
Description	This subroutine computes the discrete form of the 2-dimensional Laplace integral operators *L, M, Mt*, and *N* over a straight line element. The subroutine is useful in integral equation methods for the solution of 2-dimensional Laplace problems.
Interface	function [l,m,mt,n, lFail]= l2lc(p, vecp, qa, qb, lponel, nq, w, x, lvalid, tolGeom, tolQuad, lFail, needl, needm, needmt, needn) Input parameters *real* p(2) : *the observation point* *real* vecp(2) : *the vector corresponding to the point* p *(not always required)* *real* qa(2), qb(2) : *t he points at either side of the panel, thus defining the panel* *logical* lponel : *informs l2lc that* p *lies on the panel* qa-qb *(True) or not (False)* *integer* nq : *the number of quadrature points* *real* w() : *the quadrature weights* *real* x(): *the quadrature points* *logical* lvalid *: informs l2lc that validation of the input to the module is required (True) or not (False)* *real* tolGeom : *the expected tolerance in the accuracy of the geometrical data input to the module* *real* tolQuad : *the expected tolerance in the accuracy of the quadrature data input to the module* Output parameters *logical* lFail : *If the validation switch* lValid *is True then this returns 'True' if the parameters are validated, otherwise it returns 'False' if the input parameters are invalid* *logical* needl, needm, needmt, needn : *informs l2lc which discrete operators L, M, Mt, and/or N need to be returned (set 'True') or not ('False')* *real* l0, m0, m0t, n0 : *the values of the discrete operators L, M, Mt, and/or N. If* need* *is 'False' then a zero value is returned for the corresponding discrete operator*
Web source of code.	www.boundary-element-method.com/mfiles/l2lc.m
Web source of this guide	http://www.boundary-element-method.com/mfiles/l2lc_m.pdf
Web source of the algorithm	Computation of the Discrete Forms of the Laplace Integral Operators

Dependent routines	Utility routines for 2D geometry from the GEOM2D.bas module in dist.m, norm2.m, dotproduct.m, size.m, ssize.m, vector.m. Verification module for checking the input geometry; OkGeometry2lc.m Verification module for checking the input quadrature rule; OkQuadrature.m
Test problems or modules tested	A set of test problems are given on the spreadsheet Sheet *l2lc_test_sheet* in l2lc.xlsm
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Codes that this may be used alongside this one	This code was written as a utility routine to for the solution of 2D Laplace problems[1].
Similar codes that may be of interest	A similar Excel VBA code is available in the following file: http://www.boundary-element-method.com/Excel_VBA/l2lc.xlsm A similar code in Fortran is available: http://www.boundary-element-method.com/fortran/L2LC.FOR
Applications	To be included in the file libem2.m on the www.boundary-element-method.com website
Author	Stephen Kirkup
References	1. www.boundary-element-method.com 2. www.freemat.info 2. Computation of the Discrete Forms of the Laplace Integral Operators 3. Discretization of the Laplace Integral Operators