

Citations

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```
from firedrake import *
mesh=Mesh(...)
V=FunctionSpace(mesh, "CG", 1)
u=TrialFunction(V)
v=TestFunction(V)
f=Function(V)
x,y=SpatialCoordinate(mesh)
f.interpolate((8*pi*pi)*sin(2*pi*x)*sin(2*pi*y))
params={'ksp_type':'preonly','pc_type':'lu'}
a=dot(grad(u),grad(v))*dx
L=f*v*dx
myBCSurfaces=[...]
myBCs=[]
for surface in myBCSurfaces:
    myBCs.append(DirichletBC(V,0,surface))
BEGIN PROGRAM HERE
mesh_name ~ mesh
form ~ (dot(grad(u), grad(v))) * dx
rhs ~ f * v * dx
space_variable ~ coord
functionSpace ~ V
dirichletBCs={...}
# domain number to id mapping
domains={...}
# [domain number, domain number]->interface id mapping
interfaces={...}
solution~u
solver_settings ~ solver_parameters=params
END PROGRAM HERE
```

Important document

Balay et al. (2018) Balay et al. (1997) Dalcin et al. (2011) Rathgeber et al. (2016)

References

Balay, Satish, Shrirang Abhyankar, Mark F. Adams, Jed Brown, Peter Brune, Kris Buschelman, Lisandro Dalcin, et al. 2018. “PETSc Users Manual.” ANL-95/11 - Revision 3.9. Argonne National Laboratory.

Balay, Satish, William D. Gropp, Lois Curfman McInnes, and Barry F. Smith. 1997. “Efficient Management of Parallelism in Object Oriented Numerical Software Libraries.” In *Modern Software Tools in Scientific Computing*, edited by E. Arge, A. M. Bruaset, and H. P. Langtangen, 163–202. Birkhäuser Press.

Dalcin, Lisandro D., Rodrigo R. Paz, Pablo A. Kler, and Alejandro Cosimo. 2011. “Parallel Distributed Computing Using Python.” *Advances in Water Resources* 34 (9): 1124–39. <https://doi.org/http://dx.doi.org/10.1016/j.advwatres.2011.04.013>.

Rathgeber, Florian, David A. Ham, Lawrence Mitchell, Michael Lange, Fabio Luporini, Andrew T. T. McRae, Gheorghe-Teodor Bercea, Graham R. Markall, and Paul H. J. Kelly. 2016. “Firedrake: Automating the Finite Element Method by Composing Abstractions.” *ACM Trans. Math. Softw.* 43 (3): 24:1–24:27. <https://doi.org/10.1145/2998441>.