stubs

Release 0.1.10

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GETTING STARTED:

STUBS is a biophysical simulation library that provides a level of abstraction to models, making it easier for users to develop, share, and simulate their mathematical models. STUBS is highly suited for building systems biology models and simulating them as deterministic partial differential equations *[PDEs]* in realistic geometries using the Finite Element Method *[FEM]* - the integration of additional physics such as electro-diffusion or stochasticity may come in future updates. Systems biology models are converted by STUBS into the appropriate systems of reaction-diffusion PDEs with proper boundary conditions. FEniCS is a core dependency of STUBS which handles the assembly of finite element matrices as well as solving the resultant linear algebra systems.

INSTALLATION

Simply run `pip install fenics-stubs` in an environment with FEniCS installed. We recommend using a FEniCS docker container to minimize installation issues.

MATHEMATICS

Mathematics related to stubs.

2.1 Multi-Dimensional Reaction-Diffusion Equations

Volumetric partial differential equations

$$\partial_t u_i^{(a)} = \nabla \cdot (D_i^{(a)} \nabla u_i^{(a)}) + f_i^{(a)}(u^{(a)}) \ \text{ in } \ \Omega^{(a)}$$
$$D_i^{(a)}(\nabla u_i^{(a)} \cdot n) = r_i^{(abc)}(u^{(a)}, u^{(b)}, v^{(abc)}) \ \text{ on } \ \Gamma^{(abc)}$$

Surface partial differential equations

$$\partial_t v_i^{(abc)} = \nabla_S \cdot (D_i^{(abc)} \nabla_S v_i^{(abc)}) + g_i^{(abc)}(u^{(a)}, u^{(b)}, v^{(abc)}) \ \text{ on } \ \Gamma^{(abc)}$$
$$D_i^{(abc)}(\nabla_S v_i^{(abc)} \cdot n) = 0 \ \text{ on } \ \partial\Gamma^{(abc)}$$

FREQUENTLY ASKED QUESTIONS

1. How do I use `pip` to install `stubs`?

   The name of the package is `fenics-stubs` which unfortunately does not match the module name. Run `pip install fenics-stubs`.

FOUR

PYTHON API REFERENCE

Modules

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FIVE

PYSTUBS TEST

Testing more verbose documentation.

5.1 Testing explicit members

SIX

INDICES AND TABLES

- genindex
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