



**Technion-Israel Institute of Technology**  
**Computer Science Department**  
**Center for Graphics and Geometric Computing**

## **CGGC Seminar**

**Pablo Antolin**

Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland

### **IGATTOOLS: a general purpose C++14 library for Isogeometric Analysis**

We present the design and the implementation of IGATTOOLS [1], a C++14 general purpose library for solving PDEs using the isogeometric analysis framework [2]. The most remarkable aspect of isogeometric methods is the use of the same set of spline functions for representing the geometric domain and for describing the solution of PDEs.

In the IGATTOOLS design, the mathematical concepts of the isogeometric method and their relationships are directly mapped into classes and their interactions. This encapsulation gives flexibility to use the library in a wide range of scientific areas and applications. We provide a precise framework for a lot of loose, available information regarding the implementation of the isogeometric method, and also discuss the similarities and differences between this and the finite element method.

The library uses advanced object oriented and generic programming techniques to ensure reusability, reliability, and maintainability of the source code. Among other capabilities, the library supports the development of dimension independent code (including manifolds and tensor-valued spaces), implements multithreaded methods and takes full advantage of the underlying tensor-product structure of the problem at hand (if any). The library also provides a plugin for interfacing with ParaView [3] in order to help the user to visualize the results. A bunch of code examples to illustrate the flexibility and power of the library are presented

Finally, new upcoming features are introduced: hierarchical B-Splines, which allows to perform local refinement; and computations in 2D and 3D trimmed domains (by using Irit [4]), in collaboration with Gershon Elber (Technion).

**The lecture will be held on Monday, 25.09.2017, at 14:00, Taub 337**

**הזמנה זו מהווה אישור כניסה עם רכב לטכניון**