**Motivation:**

Vector fields tangent to a 2D manifold surface have many applications in Computer Graphics, Scientific Visualization and Geometric Design. These Tangent Vector Fields (TVF) may be used for generating textures on a surface, computing expressive renderings of a surface, modeling and visualizing a shear stress, simulating the flow of fluids or fire on a surface. These methods usually require the design of the TVF over the surface. In the past years there has been several papers on the design of TVF on a given 2D manifold either defined as a triangulation ([1], [2], [3]) or as a subdivision surface ([4]). At the kernel of each of these methods is a function that interpolates continuously discrete values of a tangent vector field over a surface.

**Objectives:**

We have two objectives. First we would like to establish a proper comparison between the previously proposed interpolation methods. Second we want to establish a new TVF design method targeted to smooth piecewise polynomial surfaces. Such surfaces are the standard model for manufactured objects, and can also be used to model arbitrary topology surfaces ([5]). We expect that a dedicated method for smooth polynomial surfaces will speed up in an order of magnitude the design of TVF on such surfaces, thereby allowing real-time design of TVF.

**Pre-requisites:**

Required skills include computer graphics techniques, linear algebra and numerical analysis. Technical skills include C++ and OpenGL programming.

**Bibliography:**