**KEYWORDS**


| Term | Description |
| --- | --- |
| Cell | Axis aligned bounding box is divided into small identical cubes. |
| Colour field quantity | It is a function that calculates how each particle is affected by all the other particles. |
| Gradient | The directional derivative of a scalar field gives a vector field directed towards where the increment is most, and its magnitude is equal to the greatest value of the change. |
| Grid | Series of vertical and horizontal lines that are used to subdivide AABB vertically and horizontally into cells in three-dimensional space. |
| Iso-surface | An isosurface is a 3D surface representation of points with equal values in a 3D data distribution which is the 3D equivalent of a contour line. |
| Marching Cubes | Marching cubes is a computer graphics algorithm, published in 1987 for extracting a polygonal mesh of an isosurface from a three-dimensional discrete scalar field. |
| NVIDIA Flex | NVIDIA Flex is a particle-based simulation technique for real-time visual effects created by NVIDIA company. |
| Polygonal Mesh | A polygon mesh is the collection of vertices, edges, and faces that make up a 3D object. |
| Unity 3D | Unity is a cross-platform game engine developed by Unity Technologies. Unity is used for developing video games and simulations for consoles and mobile devices. |
| Spatial Hashing | Spatial hashing is a technique in which objects in a 2D or 3D domain space are projected into a 1D hash table allowing for very fast queries on objects in the domain space. |

**Table 1:** Keywords

**ABSTRACT**

POF system aims at providing more optimized and faster surface identification and visualization on particle-based fluid simulations.

This project is research-based. It is possible for the small parts of the structures can change during the project. We research possible solutions for the problem and examined a lot of research papers for the algorithms. We discussed the pros and cons of various methods and decided to use specific algorithms for the mentioned reasons.

The POF system divided into a structure that has various algorithms. A control panel (controller or handler) administers these algorithms that placed as substructures in the POF system.

We can list these substructures as Hash System, Surface Particle Recognizer and Visualization parts. Hash System is an imaginary structure and serves to search for data easily. Surface particle recognizer distinguishes the surface particles. Visualization part draws the surface particles vertices which is an implementation of the Marching Cubes algorithm [4].

**ÖZET**

POF sistemi, partikül bazlı sıvı simülasyonlarında daha optimize ve daha hızlı yüzey tanımlama ve görüntüleme sağlamayı amaçlamaktadır.

Bu proje araştırmaya dayalıdır. Proje sırasında yapıların küçük bölümlerinin değişmesi mümkündür. Sorun için olası çözümleri araştırdık ve algoritmalar için birçok araştırma makalesini inceledik. Çeşitli yöntemlerin artılarını ve eksilerini tartıştık ve belirtilen nedenlerden dolayı spesifik algoritmalar kullanmaya karar verdik.
POF sistemi, çeşitli algoritmalara sahip bir yapıya ayrılmıştır. Sistemin arayüzü olan bir kontrol paneli, (denetleyici veya işleyici) POF sistemindeki alt bileşenleri yönetir.
Bu alt yapıları karma sistemi (hash system), yüzey partikül tanıyıcı ve görselleştirme parçaları olarak listeleyebiliriz. Karma (hash) sistemi hayali bir yapıdır ve verileri kolayca aramaya yarar. Yüzey partikül tanıyıcı yüzey partiküllerini ayırt etmemize yarar. Görselleştirme bölümü, Yürüyen Küpler algoritmasının [4] bir uygulaması olan yüzey parçacıklarının köşelerini çizmemizi sağlar.