Formal Outline of APOLLO Software Logic

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1 Understanding This Documentation

The idea of this documentation is simple. Any physical or mathematical logic used by the APOLLO code should be documented here.

1.1 Example

To write a formal outline you would first explain what you are doing and why (where it comes from, sources, etc). Then you would write out the mathematical logic (so far this is exactly how a normal paper would do things). Then if the logic is sufficiently complex, or we are employing some trickery, we would explain how we implement it in code.

Here's a simple equation for an example.

$$\vec{V} = \vec{V}_x \lambda \tag{1.1.1}$$

Pseudocode to explain logic if necessary (only for complex or non-intuitive things).

```
for (elem in V):
  v[idx] = v_x[idx] * lambda
```

Finally, the *most important thing.* Each equation is given a unique number, put that number in a comment above the code that implements the logic of that equation.

```
// [formal 1.1.1]
for (int i = 0; i < 100; i++) {
    // Code that performs the logic...
    // Code that performs the logic...
    // Code that performs the logic...
}
```

The comment should follow this standard template.

```
// [formal <equation>]
// examples
// [formal 1.2.3]
// [formal 2.1.9]
// [formal 1.2.5]
```

2 Hydrodymanics

2.1 Advection

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$$F = ma \tag{2.1.1}$$

3 Thermonuclear Evolution

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4 Neutrino Interaction

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