

## Notes about Equivalence Principles

- Each text or author has a slightly different discussion or approach on this subject. In the “broadest interpretation” treatments, Equivalence Principles includes *any* principle that permits solution of a given Boundary Value Problem (BVP) by replacing it with another problem for which the solution is already known or is more amenable to solution by one or more well-developed methods.

From this perspective, we can see that Equivalence Principles share the same philosophical motivation as Image Theory. Some, in fact, consider Image Theory to be just one particular example of Equivalence Principles.

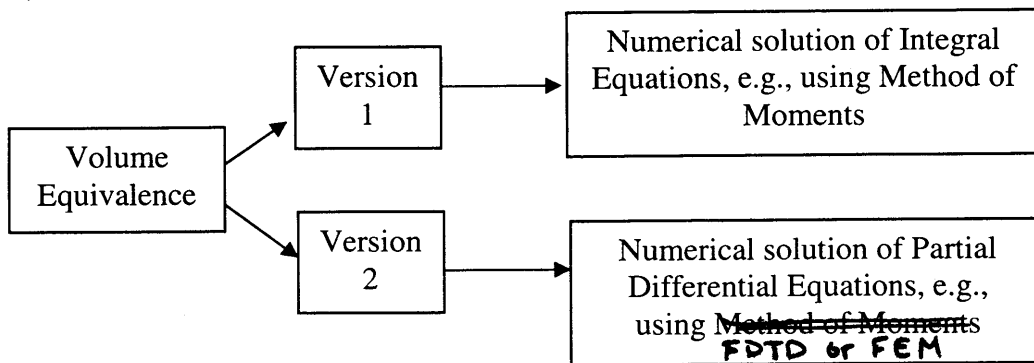
- The *general underlying justification* of all Equivalence Principles is *Uniqueness Theorem*.

Besides Image Theory, we will briefly discuss in this class:

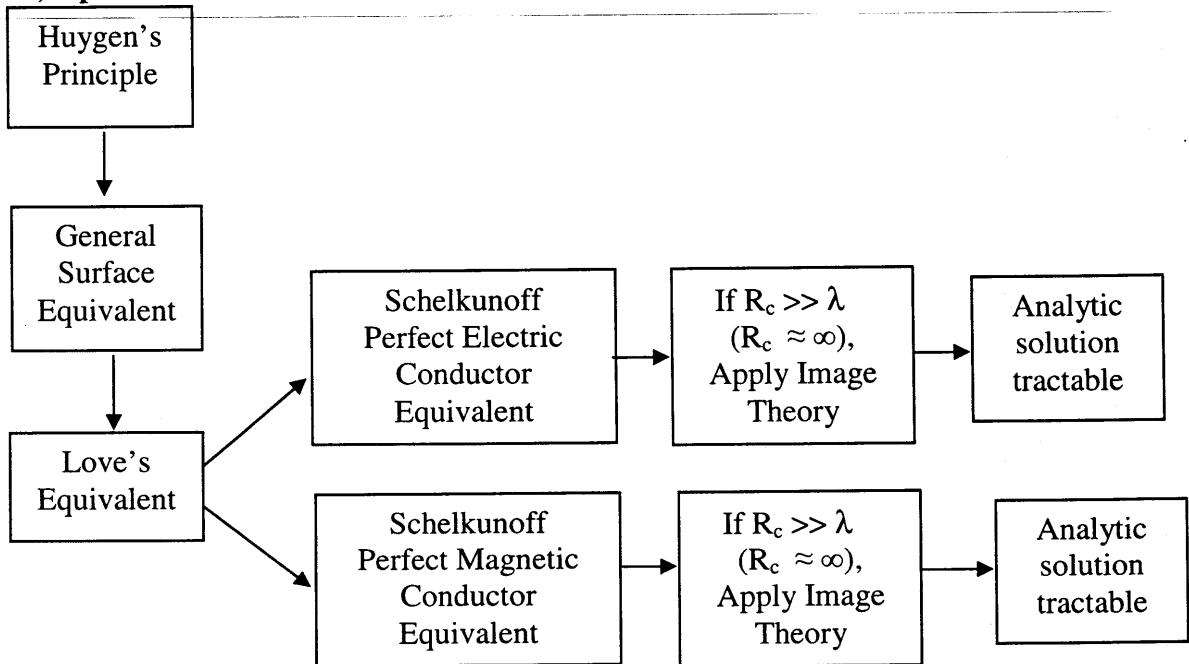
- I) Volume Equivalence Principle, which is used for modeling the scattering of EM waves by penetrable dielectric objects
- II) Surface Equivalence Principle. Derived variations of this are used to solve for aperture antenna radiation fields
- IIIa) Induction Equivalence, which is used to model scattering by PEC obstacles
- IIIb) Physical Equivalence, which is also used to model scattering by PEC obstacles

The following “flow charts” are intended to help you sort out the flow of logical development behind the following discussions of Equivalence Principles. They are sorted by the types of application problems you might need to analyze.

### I) Dielectric Scatterers



## II) Aperture Antenna Radiation



## III) PEC Scattering Obstacles

