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## Sources

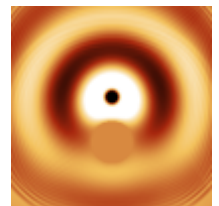
To perform a computation we need to setup at least single source of electromagnetic field. The simplest source is a point one, which is physically similar to a small dipole. More rigorous is an electric or magnetic current source which has exactly the same functionality as the electric or magnetic dipole.

If we need a plane wave to interact with our computation volume, we are no more able to use a set of point sources (unless we have extremely large computational volume which is unrealistic. Special techniques need to be used, for example one known as total/scattered field or scattered field. Both approaches are based on addition and eventually subtraction of precomputed plane wave to/from some points in the computational volume.

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*Sample parameter file: [point source](#).*

*A 200x200x200 computational domain with single point source and a metallic sphere made of a perfect electric conductor.*



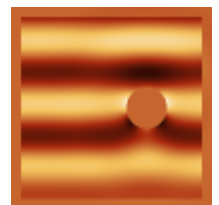
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In total/scattered field (TSF) technique we draw a boundary around the area where we need the plane wave and we add the plane wave on one side and subtract it on other side (depending on wave traveling direction). There can be anything inside TSF volume as there are no special algorithms run there.

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*Sample parameter file: [total/scattered field source](#).*

*A 200x200x200 computational domain with total/scattered field source and a metallic sphere made of a perfect electric conductor.*



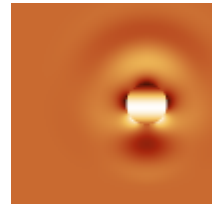
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In scattered field (SF) formulation, we only add the plane wave on tangential electric field components of interface between conductor and non-conductor, simulating the fact that in real world there are currents cancelling the tangential components of electromagnetic wave generated on such interface. At it's simplest variant this technique is therefore not suitable for dielectrics and it is used for calculations consisting of perfect electric conductors in a free space. However, comparing to TSF, it can provide more accurate results for scattering calculations in these cases.

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Sample parameter file: [scattered field source](#).

A 200x200x200 computational domain with scattered field source and a metallic sphere made of a perfect electric conductor.



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