Genetic Algorithm for Geometry Optimization of Optical Antennas
RF GEOMETRIES USED IN OPTICAL ANTENNA DESIGNS
How we can get the optimal geometry?

START

Initiation - selection of the initial population of chromosomes

Evaluation of the fitness of chromosomes in the population

Stopping criterion

NO

Selection of chromosomes

Application of genetic operators

Creating a new population

YES

Presentation of the "best" chromosome

STOP
START

Initiation - selection of the initial population of chromosomes

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STOP
Minimization function (Eq. 1), variables (geometry and/or materials), initial values

Population

Genetic Algorithm controlled by Matlab

Does the solution converge?

Yes

END

No

Partial Results (geometry and fitness function)

Solution to the Electromagnetic equations, including the evaluation of the fitness function and the simulations with COSMOL

LiveLink for Matlab
Equations (COMSOL’s RF Module)

\[ F_{\text{Fitness}} = \min \left( \frac{1}{2} \text{Re} (J_{\text{tot}} E_{\text{tot}}) \right) \]

\[ J_{\text{tot}} = E \]

\[ E_{\text{tot}} = \left( 0 \int \left( J + 0 \frac{\partial E}{\partial t} \right) \partial a \right) \]
From Matlab to COMSOL (and vice versa)
Results
Results
Conclusions
Conclusions
Work in progress
Genetic Algorithm for Geometry Optimization of Optical Antennas

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