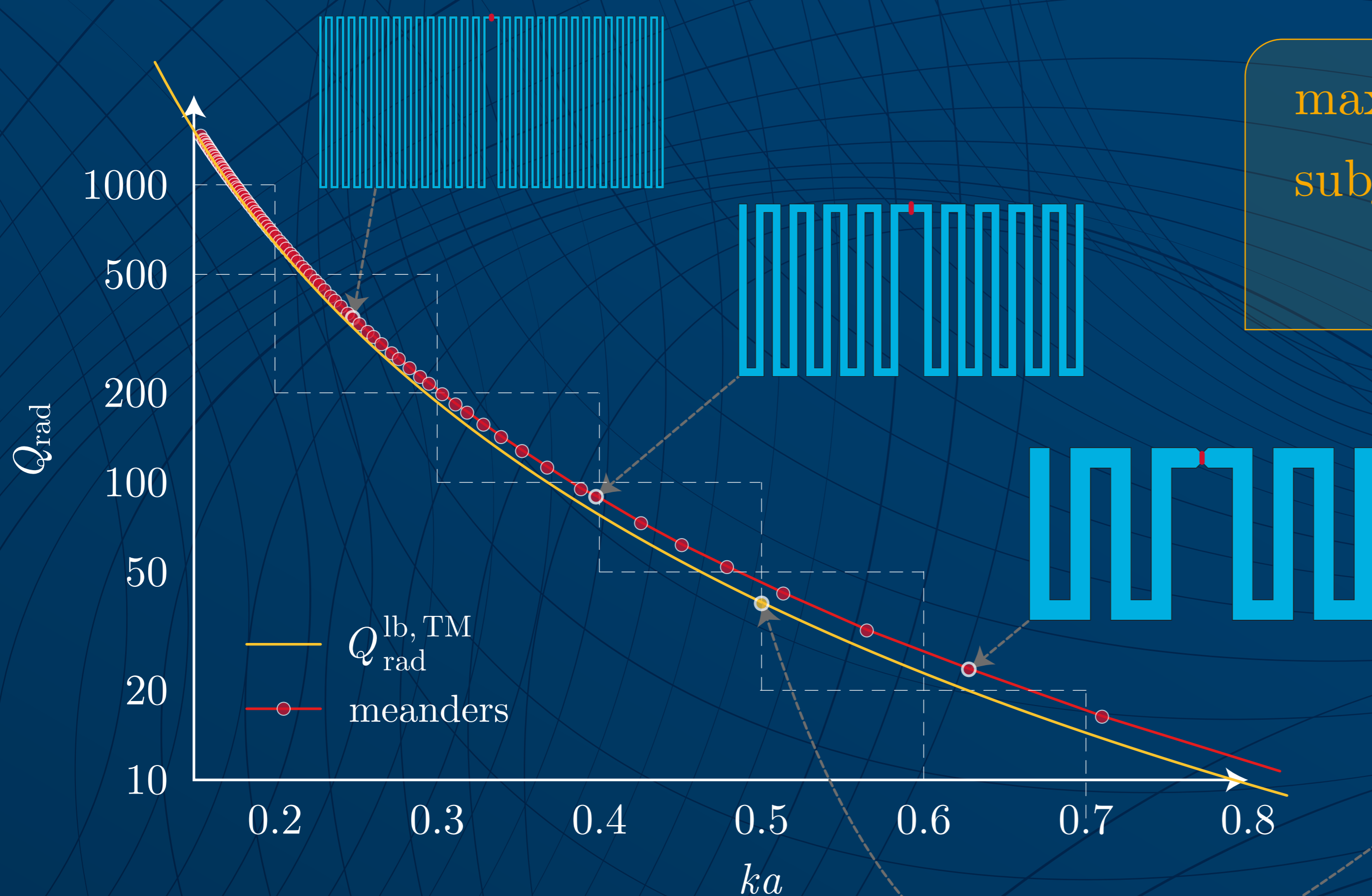


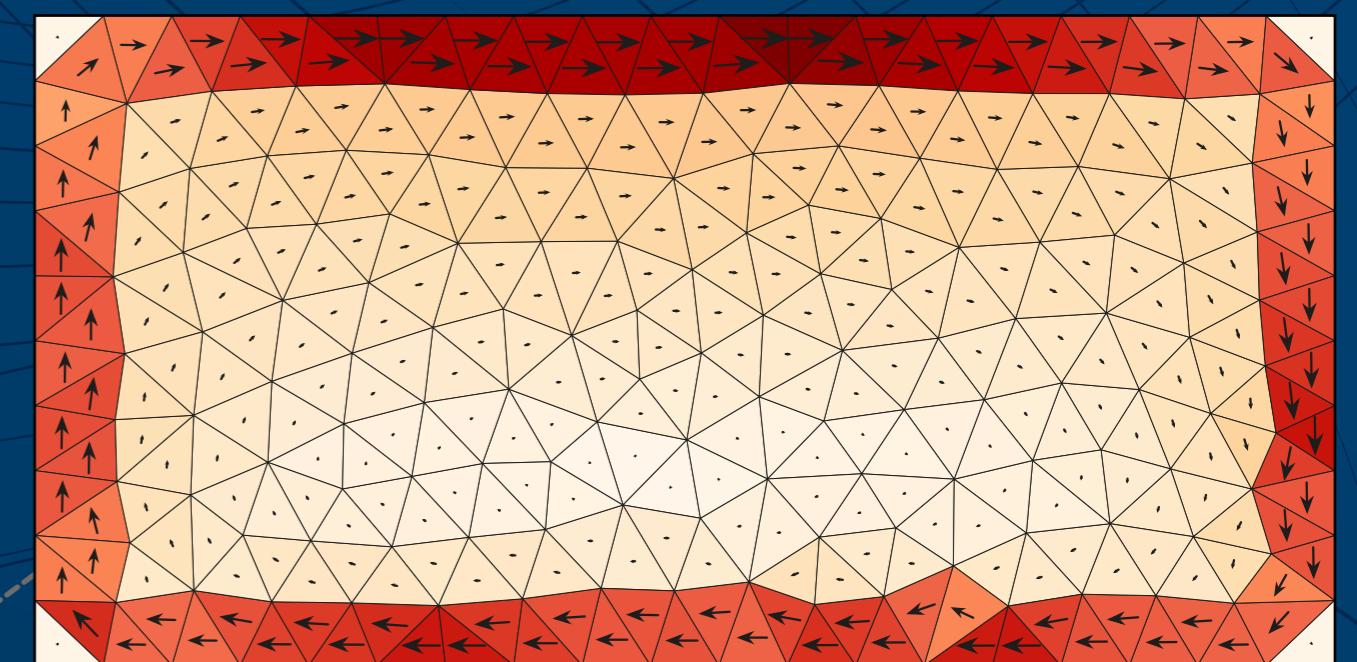
Fundamental Bounds on Antennas

Motivation

- Fundamental bounds can help engineers to judge the real performance of the radiating devices they are designing.
- Fundamental bounds on antennas have analogies in all technical branches.
- Investigation of fundamental bounds is a hot topic in antenna theory.



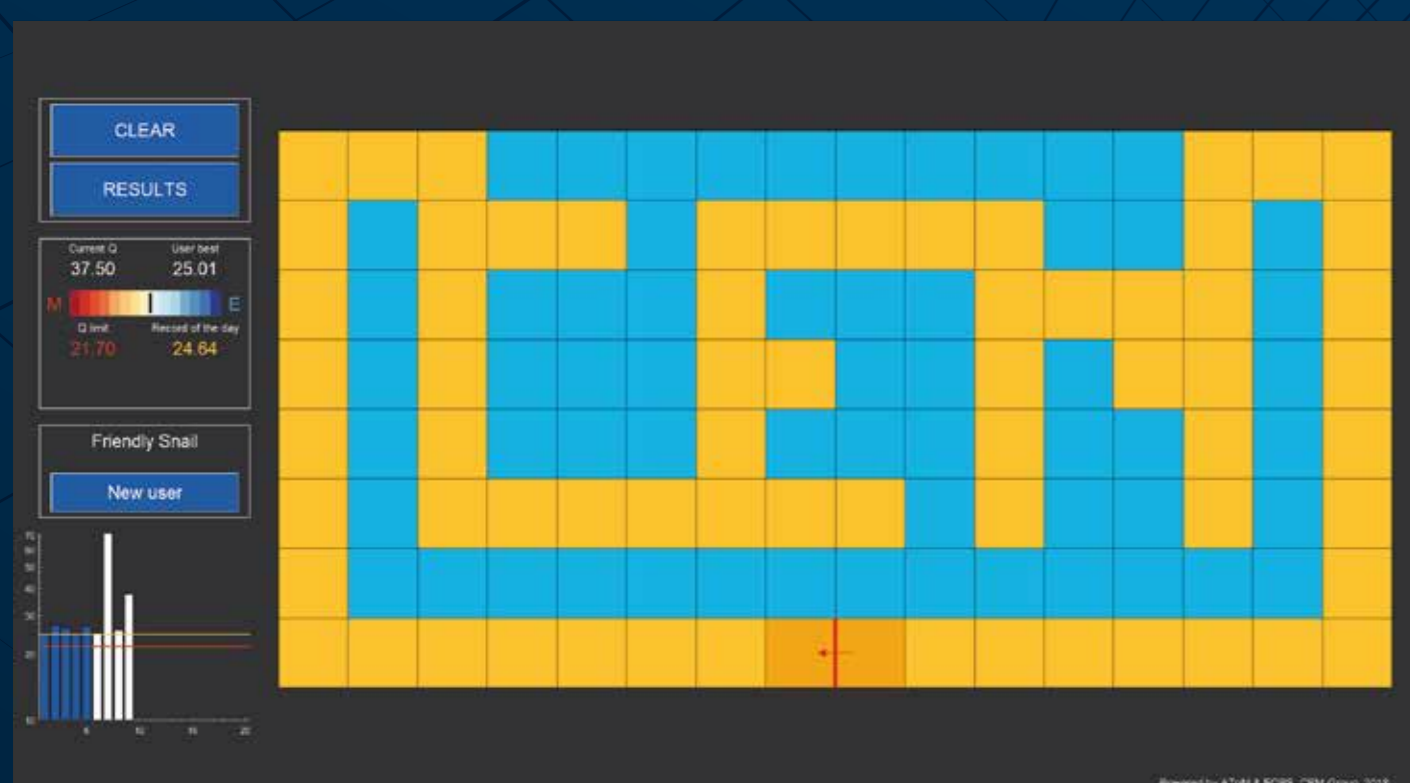
$$\begin{aligned} &\text{maximize} && \mathbf{I}^H \mathbf{R} \mathbf{I} \\ &\text{subject to} && \mathbf{I}^H \mathbf{X}_m \mathbf{I} \leq 2\bar{P}_w \\ &&& \mathbf{I}^H \mathbf{X}_e \mathbf{I} \leq 2\bar{P}_w \end{aligned}$$



Optimal current minimizing radiation Q-factor, PEC plate, $L/W = 2$, $ka = 1/2$.

Challenge

- Try to meet the bounds with your antenna!
- Touch the screen and add/remove metal.
- Antenna is fed in the middle.
- The bound is reachable in this case.



Interactive MATLAB antenna designer powered by AToM.

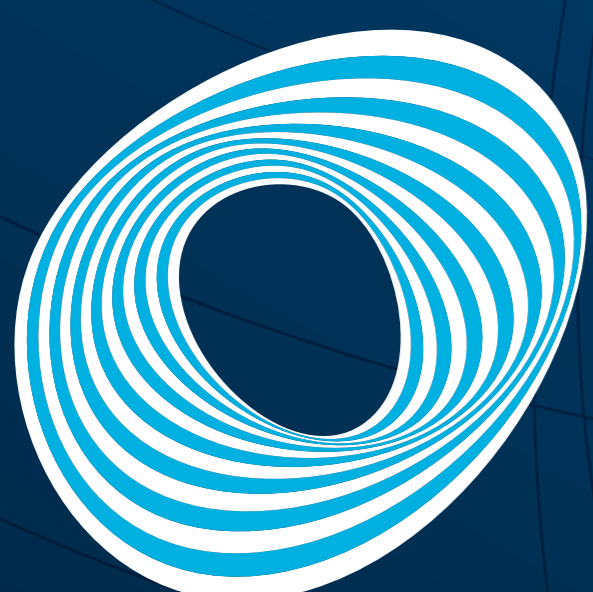
Did you know that?

...to find the bounds a variety of powerful tools have to be used: from convex optimization, operators theory, through numerical methods like method of moments to electromagnetics and antenna theory.

More...

| CEM Group | elmag.org/CEM

| Other topics: stored energy, characteristic modes, Q-factor



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