

## For invisible UAV calculations at FOI

FOI (Swedish Defence Research Agency) is one of Europe's leading research institutes in the defence and security area. FOI in Kista are, among many other things, working on designing aircraft, both manned aircraft and Unmanned Aerial Vehicles (UAVs), and making them invisible. That is, creating a signature for the vehicle that makes it invisible to IR, radar and acoustics.

An aircraft must have good aerodynamic properties and at the same time be as invisible to electromagnetic waves as possible. These two requirements are not always compatible because the different physics diverge.

The challenge for FOI is to find the best balance. It is a matter of configuring the entire aircraft and Efield provides the tools for performing simulations to aid this.

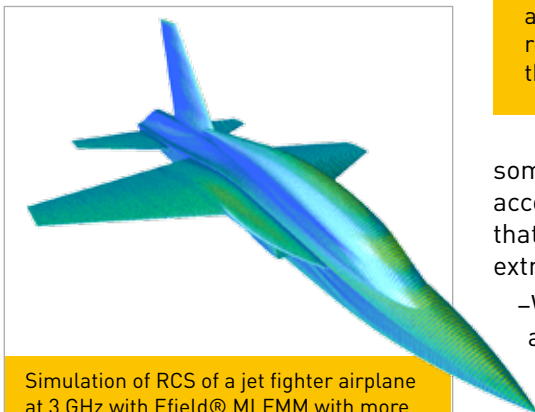
### Excellence in simulation

–We carry out computer calculations rather than measurements and experiments, says Dr. Adam Zdunek. With Efield we simulate real cases and



Associate professor Dr. Adam Zdunek,  
Head of the Aeronautic Vehicle Stealth Group (AVS)

The AVS-group specializes in designing and tuning the radar and IR signatures of aircraft. They perform large scale simulations using commercial codes and the AVS research at FOI is a part of the Swedish technology development funded mainly by the Swedish Defence Materiel Administration.



Simulation of RCS of a jet fighter airplane at 3 GHz with Efield® MLFMM with more than  $10^6$  unknowns.

sometimes compare with measurements. We have obtained very good results according to the post-test validations we have made on prototypes. These show that using calculation tools instead of conducting extensive experiments works extremely well in many cases.

–We use two types of calculations for invisibility, on improving existing vehicles and on new construction. With new construction, it is the effect of the body of the vehicle as a whole that is of primary interest. The actions we take often concern specific parts, or hot spots. Efield can take into account the way that radar signals bounce and interact with other parts. The actions taken

“One of the best benefits is the ability to split up the simulations.”

are aimed at eliminating any reflected signals, Dr. Zdunek continues.

### Saves time and effort

–One of the best benefits with Efield is the ability to split up the simulations. This means that we do not need to recalculate the entire system if we change a part. When a part is recalculated Efield can make use of descriptions completed earlier to recreate the entirety. This is a very useful property, which saves much time and effort.

### Flexible qualified research

–Thanks to Efield’s flexible architecture it is an excellent tool for qualified research. The more multi-faceted the problem, the greater the use we can make of Efield. We are not locked into a specific workflow but can in a flexible way use Efield to suit our work.



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### Let’s talk qualified results – contact us

We love challenging customers with challenging problems. We gladly talk Efield with you and how we can help you to achieve more qualified results faster. For more information please contact us or visit our website.



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### World-class simulation

–FOI is a challenging and demanding customer whose requirements on both functionality and quality have been tremendously important in shaping Efield into a world-class simulation product. Thanks to the research effort, development and high level of support from Efield we have a tool for computer calculation that lies at a high international level, Dr. Adam Zdunek ends.

#### Benefits with Efield

- Unified modelling environment for time and frequency domain
- Easy to import and reuse complex CAD models
- Efficient domain decomposition
- Novel hybrid solution methods
- Parallelized solvers
- Highly qualified support

**FOI (Swedish Defence Research Agency)** – is one of Europe’s leading research institutes in the defence and security area. The core business is research, method and technology development and studies. The number of employees is around 900, of which 800 are research-workers. FOI is financed on contracts’ basis and is responsible to the ministry of defence.

► See more at [www.foi.se](http://www.foi.se)

**Efield®** – offers a complete and unique integrated software environment for 3D analysis of a wide range of electromagnetic applications such as antenna design and integration, microwave design, EMI/EMC interaction and scattering and radar cross-section.

► See more at [www.efieldsolutions.com](http://www.efieldsolutions.com)



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