| Popular science summary of the PhD thesis | |
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| PhD student | Michael Forum Palvig |
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| Title of the PhD thesis | Analysis and Design of Wideband Matched Feeds for Reflector Antennas |
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| PhD school/Department | Electrical Engineering Department |
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| Science summary | |
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| Reflector antennas are commonly seen used for satellite TV reception on houses and apartment buildings. On the satellite, similar antennas transmit the signals down to earth. Reflector antennas are also used in many other applications where high directivity is required; including radars, radio astronomy, weather satellites, deep space communication and ground based broadband data links.  It is common to displace/offset the feed horn and reflecting surface of the antenna in such a way as to avoid that the components obstruct the radio waves entering or leaving the antenna. Doing so has many advantages, but also a major drawback, which is an increased amount of cross polarization. Cross polarization will result in unwanted signals.  The cross polarization may be reduced by using matched feeds, but these suffer from being narrowband. In this thesis, insights on the reasons for the inherent bandwidth limitation of matched feeds are presented and methods to overcome it are proposed and demonstrated.  New and effective analysis methods for matched feeds are developed and in the process it is discovered that TE01 and TM01 modes can be used in matched feeds instead of the TE21 modes presented in the literature until now.  Two new ways of constructing matched feeds are presented: 1) horns made of engineered surface materials and 2) distributed modal coupling involving coaxial waveguides. Both have the potential to eliminate the bandwidth limitation of matched feeds and for the latter, components with an unprecedented bandwidth of 30% are demonstrated.  Wideband reduction of cross polarization in offset reflector antennas will result in enhanced signal integrity wherever these antennas are used, meaning higher data rates, more reliable scientific data, or better TV signals. | |

Please email the abstract to the PhD secretary at the department