



University  
of Pardubice  
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# Ribbon Beam Antenna for RFID Technology

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# INTRODUCTION

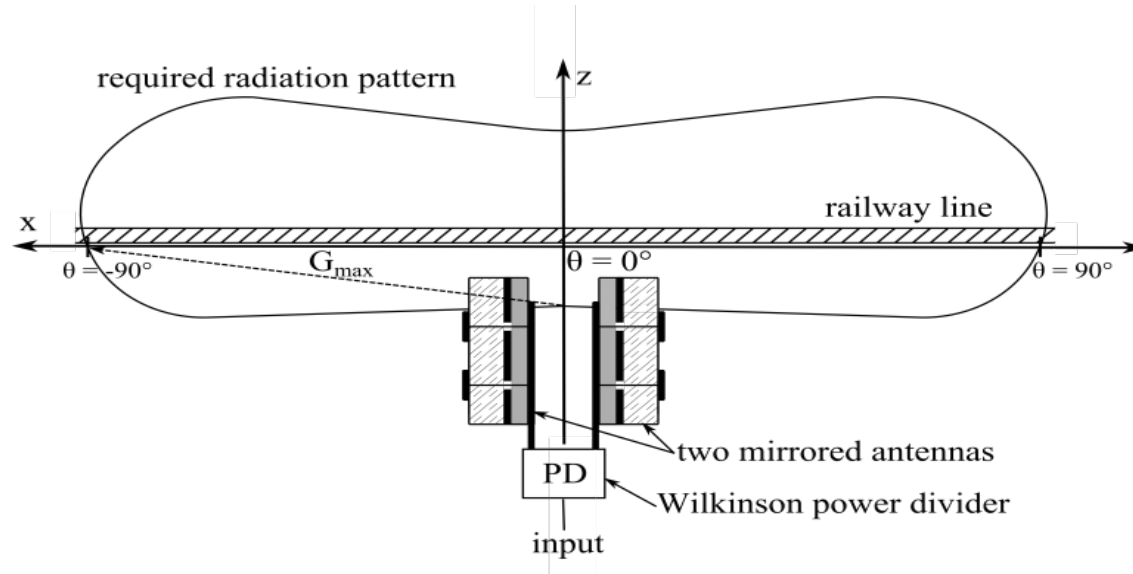
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- The developed antenna is a part of a railway information system.
- This system consists of RFID tags situated on trains and of RFID readers located near to railway lines, communicating with an information center.
- Nowadays antennas with circular radiation pattern in horizontal plane are used for these readers or in the ribbon radio networks.
- These types of antennas do not use radiated power effectively because they radiate much power in the front direction.
- Another possibility is to use two Yagi antennas oriented to the opposite sides along rails
- This system has disadvantage in very low radiation in the transverse directions.
- Normally the low coverage at short distances is not a problem but in our application (RFID) is necessary to cover near distances too.



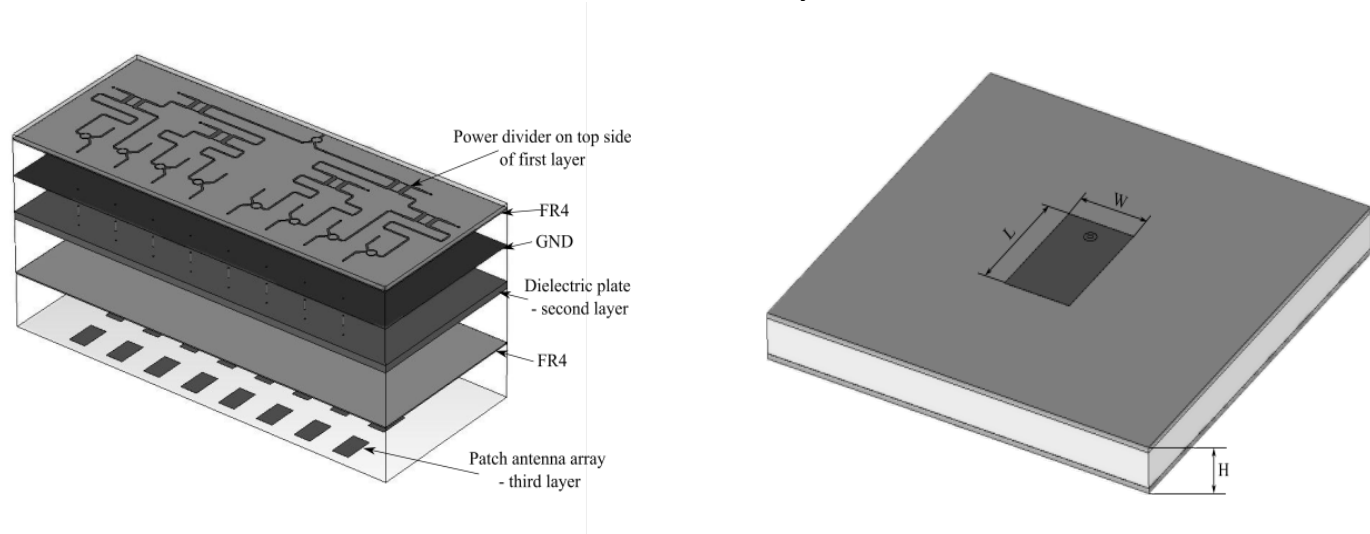
# OBJECTIVES

- The aim of this work was to design the antenna with cosecant radiation pattern on frequency 2.45 GHz.
- This shape of the radiation pattern was chosen for the best coverage of the railway line
- In reality we can only approach to this curve because a real antenna generates a rippled antenna response.



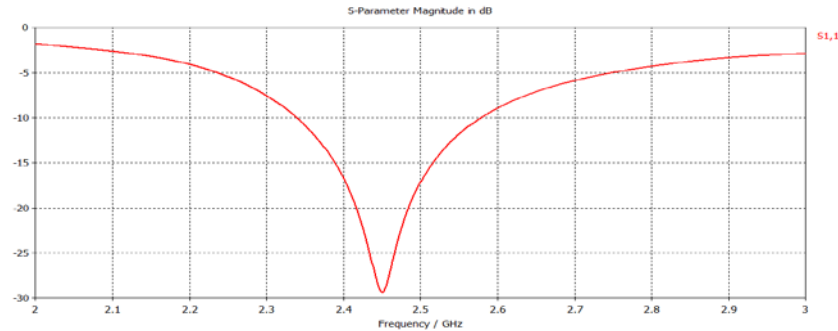
# MATERIAL & METHOD

- Antenna system consists of two identical mirrors oriented antenna parts so we may design one part of the whole antenna only.
- There are three dielectric layers.
- On the top side of this layer a feeder circuit is situated consisting of power dividers of Wilkinson and branch-line types.
- The second layer is made of a dielectric material and it is used for mechanical distance definition between the first and the third layer.
- The third layer carrying radiating elements – patches.
- Patch elements create the antenna array.

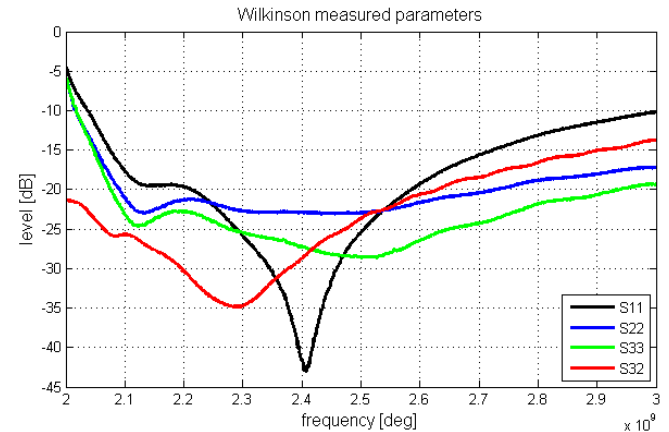
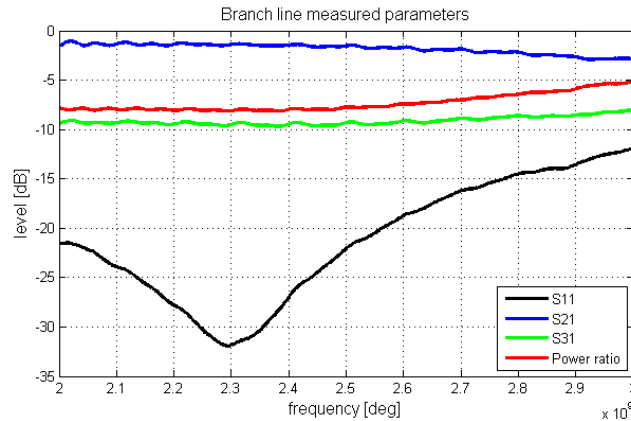


# RESULTS

- The measured return loss of one patch element is shown. There is evident a good impedance match of the patch at the centre frequency. The return loss level is quite acceptable even in the range of 100 MHz.

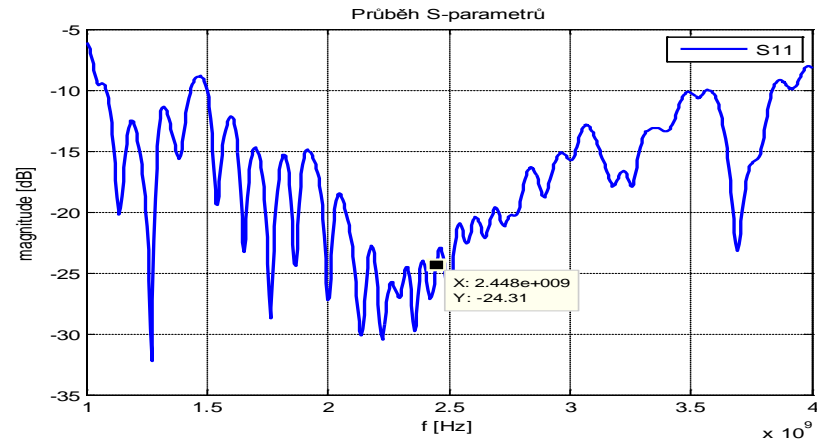


- The measured results of power dividers are presented on next picture.



# RESULTS

- The measured reflection coefficient of the whole antenna system



- The measured radiation pattern of the whole antenna structure

