A Study on the Dependency of the Teeth Sequence in Human Being

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INTRODUCTION

The teeth in human beings are one of the distinctive properties. It is in the interest of the dental researchers to derive the dependency of the teeth whether it is correlated to each other. This study is aimed to obtain whether it exists or not.

If there is an existence of correlation, the geometry of the teeth sequence should be useful in many dental applications such as orthodontic treatments. The additional aim of the study is to design the optimum teeth wire with geometry alike the teeth sequence, which is structurally applicable.

METHODOLOGY

The data used in the analysis were obtained from the photos of lower teeth forms that were taken out from the 80 patients in Istanbul University Faculty of Dentistry. The first step, in the study was to gather the Cartesian coordinates of the highest points of teeth, which are assumed the one of the most characteristic property of the teeth in human body by using MATLAB® programme. Latterly, the sets of the Cartesian coordinates of the neighbouring ones are evaluated and for these two processes, the dependency of the data is scrutinized.
Then as a supplementary work, by the means of the obtained geometry, the teeth wire structure has been designed and analysed to represent the geometry of the teeth of the 80 patients.

THE STEPS OF THE WORK

The top points of the each tooth of the every single patient have been obtained by using the image process commands of MATLAB® and given on the right. These data are used to obtain the polynomial curve that fits. The curve is given in figure 2. Even tough the curves are defined by the x and y coordinates, for the sake of applicability in dentistry, the number of the parameters in the definition should be as more realistic as they can be. Therefore, the parameter in the definition is chosen as the distance between the rear teeth that is a common assumption in dentistry.
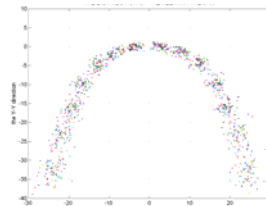
The distribution of the teeth

The optimum curve is used to create model of teeth wire which is used to see the distribution of the pressure on teeth due to the tip displacements. The innovative part of this study is to recommend the dentists to pull the tips of the wire about 3 mm in order to gain pressure on tooth within the limits of pain and effectiveness.

Results
- ✓ The data of the teeth locations have been obtained by using MATLAB® programme.
- ✓ The dependency of the tooth dimensions have been proven, while the sequence of the teeth is uncorrelated.

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- ✓ The geometry of the teeth data has been obtained by using the mean Cartesian coordinates of the each tooth. The derived curve has been normalized based on the distance between the rear teeth number #37 and #47. This enables the dentists to obtain the form of the teeth wire so fast that only measurement of the expressed distance in any patient.
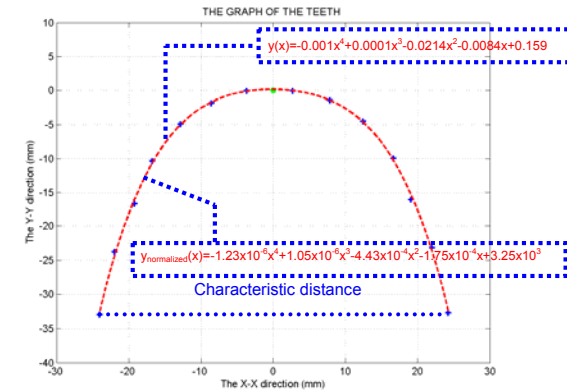
- ✓ After the independency of the teeth sequence is proven, it is assumed that the geometrical shape of the sequence is applicable in the formation of the teeth wire. Therefore, a teeth wire structure is formed based on the geometry of the sequence and an analysis has been applied in order to obtain the stresses on the teeth due to the wire by using SAP2000.

- ✓ The optimum displacement at the tips of the wire has been derived about 3 mm. As 3 mm displacement of pulling the wire is applied, the stresses occurred on the teeth have been plotted on a histogram graph and the mean value of the pressure on the teeth due to the pulling of the wire at the both ends axially has been found as 64.15 MPa which is reasonable regarding the dislocation of the teeth.
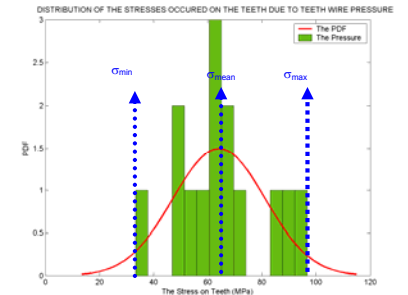
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