in membrane walls assemblies is an important step in design and sizing of the utility boiler's furnace. Because of geometric complexity and discontinuous properties of the fin-tube assembly, a numerical method is used, and for a simplified case of steady-state and no welding angle an analytical approach has been performed. The effect of the welding angle as well as fin width and thickness upon temperature distribution in the membrane walls have been considered. To obtain heat flux on the furnace sector of the tubes, the view factors between the flame considered as a parallel plane and the membrane walls has been evaluated. Also for the "Start up" of the boiler the distribution of temperature in membrane water-wall is obtained by finite element method and the effect of the tube thickness, fin thickness and width have been studied. It is also shown that the fin effectiveness as well as the insulated sector of the tube are closely related.

Studying The Instability Of The Patellofemoral Joint Using A Two Dimensional Mathematical Model

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The instability of the patellofemoral joint in the transverse plane was studied in a two dimensional mathematical model with deformable contact surfaces. Articular surfaces, muscles, retinaculum and patellar tendon, and articular cartilage were simulated as orthogonal polynomials, strings with known forces, tensile springs, and a set of compression springs, respectively. The resulted nonlinear equations, including three equilibrium equations and one constraint equation for each cartilage spring, were solved using Newton-Raphson method. Results indicate that total dislocation of the patella only occurs if the joint's soft and hard tissues are both abnormal. Lateral displacement of the vastus medialis attachment to the patella, was appeared to be the most effective surgical procedure for treatment of patellar instability disorders.

Mechanism Of Reduction Of Copper Chloride From Liquid N-Butylamine-Naphthalene Electrolyte

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Aromatic solutions containing N-Butylamine salts have sufficient thermo-chemical stability, wide polarization potential, high boiling point and acceptable dielectric coefficient suitable for electrolytic coating of the active metallic ions. In this study, nucleation/growth kinetics of thin metallic layers precipitated from copper containing N-Butylamine complexes dissolved in naphthalene is investigated via cyclic voltammetry, chronoamperometry and electrochemical impedance frequency response method. Results indicate an instantaneous three-dimensional electrochemical crystallization of copper concomitant with a diffusion-controlled growth regime. The diffusion coefficient of copper containing complex and the standard rate constant of the reaction are calculated from the data, which appear to be in the range of $3-6 \times 10^{-6}$ cm^2/s and $2-6 \times 10^{-3}$ cm/s., respectively. The relatively small reaction as well as diffusion rates seem to be due to the complexion of copper ions with large aromatic legends.

Production And Purification Of Pentaerythritol – Investigation Of Effective Parameters On Yield And Study Of Purification Methods

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Pentaerythritol (PE) is a tetravalent alcohol mainly used in painting (as alkyol resins) and military industries. PE is produced by reaction of acetaldehyde with formaldehyde in aqueous solution containing sodium hydroxide. The byproducts of the reaction are