عنوان مقاله:

NUMERICAL SIMULATION or INTERVERTEBRAL DISC BULGING BY EMPLOYING A POROELASTIC MODEL BASED ON CT-SCAN IMAGES

محل انتشار:

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خلاصه مقاله:

Intervertebral disc (IVD) is the load bearing part of spine column which makes the human movements possible. By aging and doing heavy deeds IVD starts to bulge out. Discbulging imposes pressure to the nerves and causes intolerable back pain. In the present study, a real three- dimensional model of the IVD is constructed by using computed tomography (CT scan) images. By simulating the IVD as a poroelastic material, bulging procedure is sirnulatcd under different uniaxial cotnpressive loads. The major results of the modeling are the fluid flow velocity and pressure of the water coI1tent inside the IVD and also disc deformation. Results indicate that by enhancing the applied compressive strain, fluid pressure inside the IVD and fluid flow from the lateral surface of the disc increase. By 2.5 times increase of the load on the disc, maximum disc deformation increases 2.12 times which is the initiation factor of disc bulging and herniation. Also in the mentioned condition, maximum fluid pressure and velocitythrough the disc become 1.103 and 2.49 times greater. The results imply that the simulation can properly predict the bulging procedure of the disc.

کلمات کلیدی:

Intervertebral disc. poroelasticity, Disc bulging, intradiscal pressure. finite element method

لینک ثابت مقاله در پایگاه سیویلیکا: