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| Author(s)    | Li, Yongzhi; Lu, Hao; Chen, Junmei et al.   |
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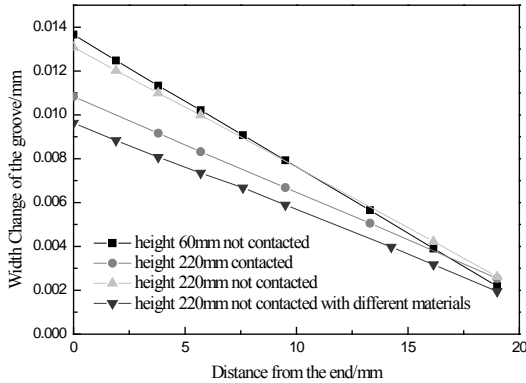
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Three parameters are discussed in our simulation, the height of the compressor shell, material properties of the cylinder, and whether the shell is in contact with the cylinder. **Figure 3** shows the width change of the blade groove with different parameters. The results show that, the height of the compressor shell has little effect on the width change of the blade groove. The width change becomes smaller when cast steel is used for the cylinder. In the simulation, the Young's Modulus of the cast steel is smaller than the shell's. And the width change can be decreased by decreasing the material Young's Modulus of the cylinder material. When the shell is in contact with cylinder, the width change is also decreased.



**Fig. 3** The width change of the blade groove with different parameters

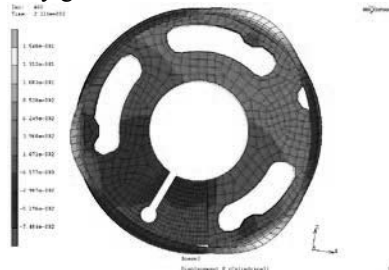
The deformation of the shell with different parameters is shown in **Fig. 4**. Three different cases are discussed:

Case A, the shell and the cylinder are in contact, and using the same material properties.

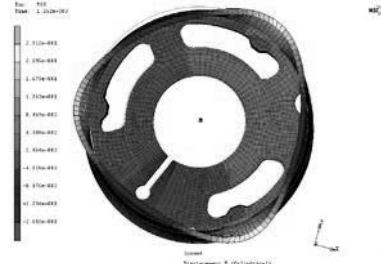
Case B, the shell and the cylinder are not in contact, using the same material properties.

Case C, the shell and the cylinder are not in contact, the cylinder using different material properties.

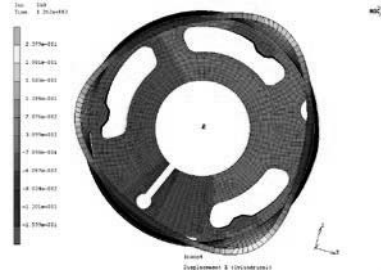
The results show that, the deformation of the compressor shell seems like a “flower”. When the shell and the cylinder are in contact, the deformation of the shell is much smaller. The cylinder roundness of these three cases are 229 $\mu\text{m}$ , 416.2 $\mu\text{m}$  and 397.8 $\mu\text{m}$ . And in the experiment, the measured cylinder roundness is 377.41 $\mu\text{m}$ , which is in very good with the case C.



(a) Case A ( $\times 40$ )



(b) Case B ( $\times 30$ )



(c) Case C ( $\times 30$ )

**Fig. 4** Contours of radial deformation under different conditions

## 4. Conclusions

According to the simulation results, the following conclusions can be obtained:

(1) The height of the compressor shell has little effect on the width change of the blade groove. The width change becomes smaller when cast steel is used for the cylinder.

(2) When the shell and the cylinder are in contacted, the deformation of the shell is much smaller. And in the experiment, the measured cylinder roundness is 377.41 $\mu\text{m}$ , which is in very good with the case C.

## Acknowledgement

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