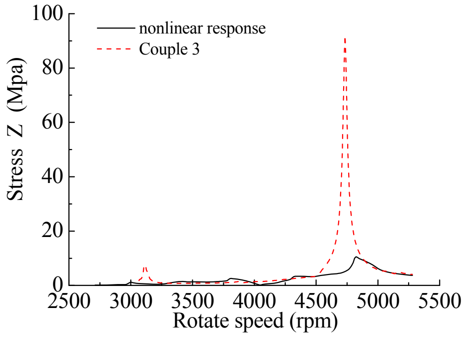
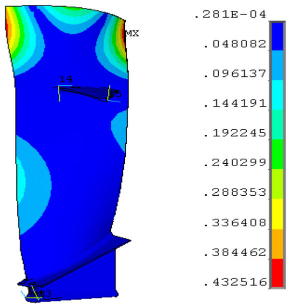


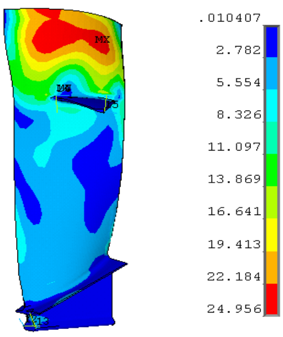
(d) Z direction stress curve with engine speed

Fig.4.2 Node 3370 of the stress response curve with engine speed

From the figure.4.1 and figure.4.2 can be seen in the existing compressor blade convex shoulder structure dry friction damping effect is very obvious, in the whole speed range of each direction vibration displacement and stress has a lot of lower. Displacement maximum response by coordination of 2.75 mm (4700 rpm) be reduced to consider dry friction damping effect of 0.43 mm (4800 rpm); The maximum equivalent stress by coordination of 184 Mpa (4700 rpm) reduced to consider dry friction damping effect 24 Mpa (4800 rpm).



(a) Displacement response images



(b) the stress response cloud images

Fig.4.3 Consider the maximum response of the fan blades cloud images in the operating speed range of design state dry friction damping

Calculate the stress response for different frequency blade under stress and displacement response of the distribution by finite element method. Consider dry friction damping action get work speed within the scope of the maximum response vibration mode, and don't take time two node displacements coordinate the entire sixth order resonance vibration mode similar, but the response amplitude greatly reduced. Maximum stress response distribution and does not consider the dry friction stress distribution is also similar, but stress amplitude greatly reduced.

V. CONCLUSIONS

1) Different friction coefficient corresponding tangential contact stiffness with positive pressure change curve. Contact surface tangential stiffness with normal positive pressure increases while the, but the increase rate tends to slow. Friction coefficients on the tangential stiffness influence is mainly embodied in the positive pressure is less than 400 n, when positive pressure is large friction coefficient of the response is very small.

2) In this paper research compressor blade speaking. Through calculation, the actual engine work process contact only area of contact and pressure distribution is not uniform. So according to the above analysis, we can know, for the compressor blade speaking, the contact stiffness value influenced by the contact surface shape and the influence of the friction coefficient is very small, and working process of contact stiffness should be changed little.

3) Convex shoulder structure of different contact surface state will not only affect the blade resonance peak size, also will change resonance speed. Therefore, when the design to comprehensive consideration of the damping effect and resonance speed, best can directly to avoid harmful resonance; If avoided, should make vibration stress reduced to a reasonable level.

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