In Figures 2 the variation of tangential stress t_{31} with wave number k is shown. The diffusion effect is shown for LS, GL and CT theories.

In Figures 3 the variation of tangential couple stress (m_{32}) is shown. Here the tangential couple stress increases up to value $k = 2$ then decreases regularly. The same trend is followed after neglecting the mass concentration effect.

In Figures 4 the variation of micro stress (λ_3) is shown. For microstretch thermoelastic solid with mass diffusion with LS theory, the micro stress first increase until k reaches value around 2 and then decreases. The same behavior is shown in case of GL theory and the CT theory.

It is observed from the Fig. 5 that the value of normal stress t_{33} for LS, GL and CT theory of thermoelasticity for microstretch thermoelastic medium with mass diffusion decreases with the increase of the parameter k under the effect of mechanical source. The normal stress for LS, GL and CT theory for micropolar thermoelastic medium without mass diffusion increases near the source and then uniformly decreases and converges to zero.

In Figures 6 the variation of tangential stress t_{31} with wave number k is shown. The microstretch effect is shown for LS, GL and CT theories.

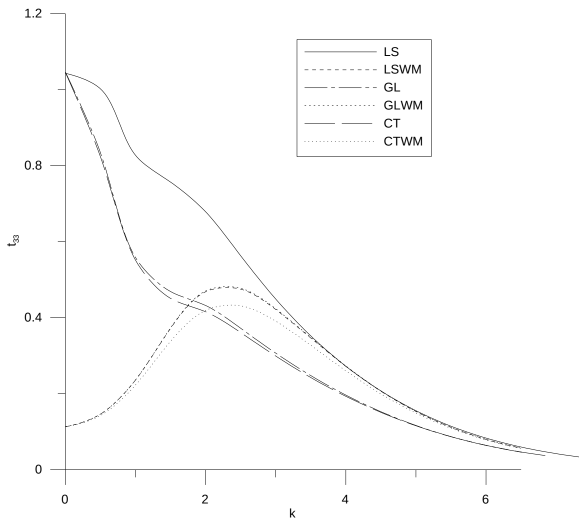

Fig. 5. Normal stress t_{33} as a function of wave number k.

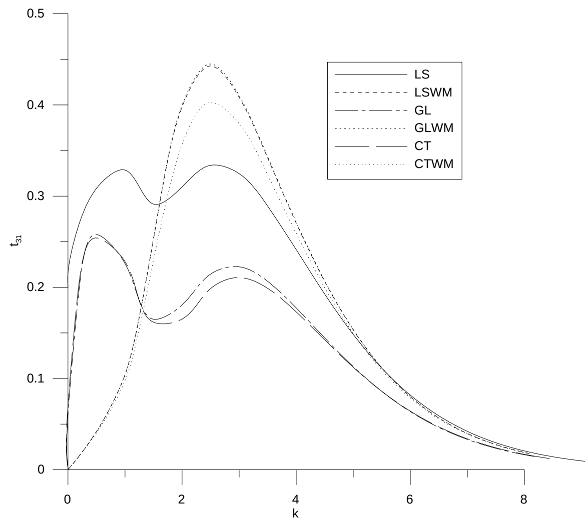

Fig. 6. Tangential stress t_{31} as a function of wave number k.

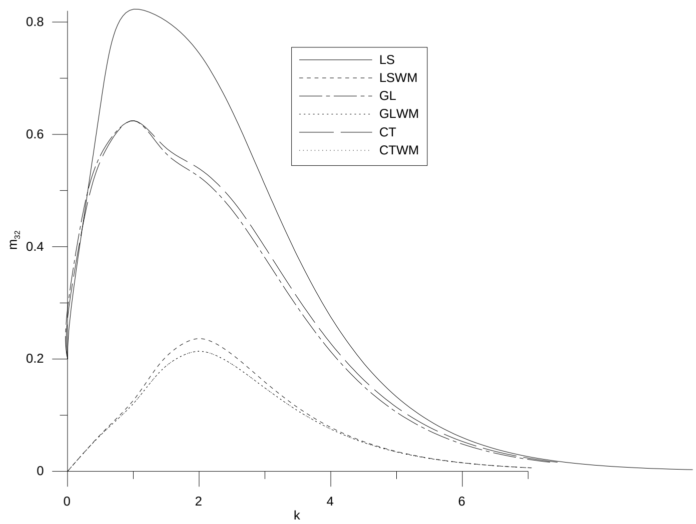

Fig. 7. Tangential couple stress m_{32} as a function of wave number k.

In Figure 7 the variation of tangential couple stress (m_{32}) is shown. Here the tangential couple stress increases up to value $k = 2$ then decreases regularly. The same trend is followed after neglecting the microstretch effect.

5. Conclusions

Such dynamical loading may produce shear deformation and temperature rise in a thin zone near the half space surface and thereby cause excessive wear and even cracking near the contact zone. It is therefore useful to analyze this class of problems by using a formulation that is as exact as possible and provide to the result for surface field quantities (displacement stress, micro-rotation and temperature change) that may be required for designing problems.

The problem is useful for geophysical mechanics where the interest is the phenomenon in earth quake and measuring of displacement in certain sources. The results of the problem may be applied to a wide class of geophysical problems involving temperature change. The deformation at any point of the medium at any point is useful to analyze the deformation field around mining tremors and drilling into the crust of the earth.

Finally we conclude:

(i) The normal mode analysis technique is used to derive the components of normal stress, shear stress, couple stress, microstress, temperature distribution and the mass concentration.

(ii) Values of displacement components, stress components are close to each other due to LS, GL and CT theories.

(iii) Behavior of variation of stress components is shown in figures.

(iv) The stress components show a similar trend under different theories.

(v) The effect of mass concentration and microstretch are shown in figures for three theories i.e. LS, GL and CT theories.

References

[1] A.C. Eringen // *Indiana University Mathematics Journal* **15** (1966) 909.

[2] A.C. Eringen, *Micropolar elastic solids with stretch*, ed. by M.I. Anisina (Ari Kitabevi Matbassi, Istanbul, Turkey, 1971).

[3] A.C. Eringen // *International Journal of Engineering Science* **28(12)** (1990) 1291.

[4] A.C. Eringen, *Microcontinuum Field Theories I: Foundations and Solids* (Springer-Verleg, New York, 1999).

[5] W. Nowacki // *Bulletin de l'Acad´emie Polonaise des Sciences. S´erie des Sciences* Techniques **22** (1974) 55.

[6] W. Nowacki // *Bulletin de l'Acad´emie Polonaise des Sciences. S´erie des Sciences Techniques* **22** (1974) 129.

[7] W. Nowacki // *Bulletin de l'Acad´emie Polonaise des Sciences. S´erie des Sciences Techniques* **22** (1974) 275.

[8] W. Nowacki // *Engineering Fracture Mechanics* **8** (1976) 261.

[9] W. Dudziak, S.J. Kowalski // *International Journal of Heat and Mass Transfer* **32(11)** (1989) 2005.

[10] Z.S. Olesiak, Y.A. Pyryev // *International Journal of Engineering Science* **33(6)** (1995) 773.

[11] S.D. Cicco // *International Journal of Engineering Sciences* **41** (2003) 187.

[12] M.A. Ezzat, E.S. Awad // *Journal of Thermal Stresses* **33(3)** (2010) 226.

[13] R. Kumar, A. Miglani, S. Kumar // *Multidiscipline Modeling in Materials and Structures* 7(1) (2011) 29.

[14] R. Kumar, T. Kansal // *ISRN Applied Mathematics* (2011) Article ID 764632.

[15] H.H. Sherief, F. Hamza, H. Saleh // *International Journal of Engineering Sciences* **42** (2004) 591.