1. lid was 0.2—0.3 mm. During the measurements, the lid tightly adhered to the upper boundary of the melt, providing a reliable friction surface. Rotation of the lid relative to the cru­cible was not possible.

The temperature dependences of the viscosity were measured in a heating regime from the melting point of cobalt to 1973 K and subsequent cooling to its crys­tallization in steps of 15—25 K. At each temperature, the melt was held for 20 min, after which no less than ten measurements were performed. The temperature of the melt was determined with an accuracy of ±5 K with a tungsten-rhenium thermocouple, 3—4 mm under the bottom of the crucible, calibrated for the melting points of pure metals (Al, Cu, Ni, Fe).

The kinematic viscosity values were calculated by numerical solving the equation of motion of the cup [23, 24]:

Re(L) + — Im(L) - 2I (5 - У = 0,

2п ^ т т0 )

where I is the moment of inertia of the suspension sys­tem; 5, т, 50, т0 are the damping decrement and the period of oscillations of the suspension system with and without a melt, respectively; Re(L) and Im(L) and the real and imaginary parts of the friction func­tion, taking into account two side surfaces of friction.

The thermal expansion of the crucible material entered the

H = -mr, nR p

in a temperature range of 1400-2000 K and at p = 1.5 bar. The system consisted of N = 4000 atoms in a cubic cell with periodic boundary conditions. The interaction between atoms was taken into account by the EAM potential [28]

U = £ q(rv) + £ F (Pi),

i,j i

Pi = § Mnj).

j

Here, ф(г) is the pair potential of interparticle interaction, and F (p) is the embedded function, which effectively takes into account multiparticle correla­tions via the electron density p, of the ith atom. The supercooled cobalt melt was obtained by rapid cooling of the equilibrium melt (at 2000 K) at a cooling rate of

Y = 10 K/s [29]. Integration of the equations of motion was carried out according to the Verlet velocity

algorithm with a time step of т = 10-15 s [30]. To bring the system to a state of thermodynamic equilibrium and to calculate the spectral characteristics at each tem­perature of 1400, 1500, 1600, 1700, 1800, 1900, and 2000 K, the program performed 105 and 5 x 106 time steps, respectively.

The simplest way to verify the accuracy of the potential of interparticle interaction to reporoduce of the structural properties of the system is to calculate the radial distribution function of atoms [31]

g(r)=f( § § ^ - 4

and the statistic structure factor [32, 33]

S(k) = 1 + N J [(r) -1] exp [ (k, r)] dr,

which can be compared with the experimental X-ray and neutron diffraction data.

